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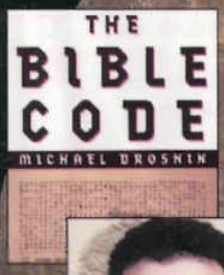
Skeptical Inquirer

THE MAGAZINE FOR SCIENCE AND REASON

Volume 21, No. 6 • **November/December 1997**

The MARS Effect in Retrospect

Jan Willem Nienhuys



Hidden Messages and The Bible Code

David E. Thomas

Science, Scientism, and Anti-Science in the Age of Preposterism

Susan Haack

An interview with Glenn T. Seaborg

Men in Black and *Contact*

Edward Summer

Published by the Committee for the Scientific Investigation of Claims of the Paranormal

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The SKEPTICAL INQUIRER (ISSN 0194-6730) is published bimonthly by the Committee for the Scientific Investigation of Claims of the Paranormal, 3965 Rensch Rd., Amherst, NY 14228-2743. Printed in U.S.A. Second-class postage paid at Amherst, New York, and additional mailing offices. Subscription prices: one year (six issues), $32.50; two years, $54.00; three years, $75.00; single issue, $4.95. Canadian and foreign orders: Payment in U.S. funds drawn on a U.S. bank must accompany orders; please add US$10 per year for shipping. Canadian and foreign customers are encouraged to use Visa or MasterCard.

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Articles, reports, reviews, and letters published in the SKEPTICAL INQUIRER represent the views and work of individual authors. Their publication does not necessarily constitute an endorsement by CSICOP or its members unless so stated.

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Skeptical Inquirer

November/December 1997 • VOL. 21, NO. 6

On the Cover: Mosaic of the Syrtis Major hemisphere of Mars projected into a point perspective, a view similar to that which one would see from a spacecraft. Image prepared by the U.S. Geological Survey for NASA. Provided by the National Space Science Data Center.

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"Hidden messages" can be found anywhere, provided the seeker is willing and able to harvest the immense field of possibilities. But do they mean anything?

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We are in danger of losing our grip on the concepts of truth, evidence, objectivity, disinterested inquiry. The preposterous environment in which academic work is presently conducted is inhospitable to genuine inquiry, hospitable to the sham and the fake. Encouraging both envy and resentment of the sciences, it has fed an increasingly widespread and articulate irrationalism.

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An Interview with Glenn T. Seaborg

He discovered plutonium and co-discovered at least nine other elements. He is considered one of the founding fathers of nuclear medicine. He received the 1951 Nobel Prize for chemistry. This year, element 106 was named after him. SI *interviews public man of science Glenn T. Seaborg.*

47 *Men in Black* and *Contact*: Night and Day

We all can use a little taste of wonder. The question is, what's the best way to inspire it? In a time when science is seriously misunderstood, the job isn't easy.

EDWARD SUMMER

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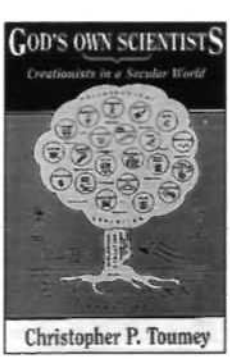

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EDITOR'S NOTE

Illusions of Their Own Making?

The Mars Pathfinder and Mars Global Surveyor missions this year have brought Mars back into vivid public and scientific consciousness, the most since Viking landed on Mars in 1976. But for even longer than we've been sending spacecraft to Mars for real scientific exploration, Mars has beckoned us in other ways as well. Percival Lowell's "canals" stimulated intense speculation in the early part of the century; they turned out to be illusory.

For several decades a tenacious hypothesis known as the "Mars effect" has simmered quietly along the borderlands between science and fringe-science. It was advanced by the French psychologist Michel Gauquelin. Gauquelin was a strong critic of traditional astrology but a strong devotee of his own brand of neo-astrology. He contended that his painstakingly collected statistics on times of birth showed, among other things, that outstanding athletes tend to be born preferentially when Mars is in two particular (of six) equally spaced sectors in the sky.

Most scientists—other than astronomers and psychologists—probably were not even aware of the claim, but it has been a troublesome one for serious skeptics. Here, after all, was a specific, empirical, testable hypothesis that, if true, seemed to have no scientific explanation. Throughout the 1970s and early 1980s intense controversy swirled about the matter. Tests were proposed, new data gathered, tests published, and a new round of controversy begun. Nothing was resolved with finality.

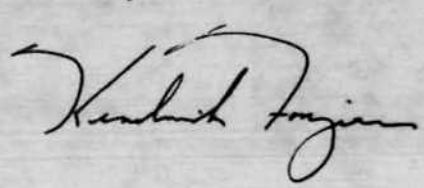
In this issue, we publish an important new critical evaluation of the Mars effect hypothesis by mathematician Jan Willem Neinhuys of Eindhoven University of Technology. By examining discrepancies between Gauquelin's database and a new database compiled by the French skeptical committee CFEPP according to a strict protocol (and which found no Mars effect), Neinhuys has identified what he judiciously calls "a severe selection bias" by Gauquelin. A pattern of apparent selective data mining and data omission was repeated in many different ways. Perhaps no one will ever know whether Gauquelin himself was aware of his own selective biases. As Nienhuys comments, "Even the best scientists can be trapped in illusions of their own making."

* * *

Following that, physicist/mathematician David E. Thomas examines the central tenet of the new best-selling book *The Bible Code*. Author Michael Drosnin contends that, when analyzed by computer, the Hebrew Bible contains a complex code of "hidden messages"—modern names and phrases that foretell many modern events. He likewise contends that such "messages" cannot be found in other works. Thomas wrote computer programs to carry out the same kind of "equidistant-letter-sequence" analyses Drosin used. And, funniest thing: Despite what Drosnin says, you can find the same kinds of remarkable coincidences of modern names, words, and phrases in other works as well. "UFOs"? "Roswell"? They're linked in the King's James Version of Genesis (which as an English translation shouldn't have kept the same "codes"). "Nazi"? "Hitler"? They're linked in both *Edwards v. Aguillard*, a noted Supreme Court decision on creationism, and in *War and Peace*. Even Martin Gardner is in there. It is now obvious that you can find all manner of modern names and references in any sufficiently long document. It's all simply a property of the billions of chances inherent in the search procedure. This should be no surprise to most of our readers, but what is the proper response of Drosnin? His publisher? All those honestly misled by the claims? We shall see.

* * *

These are all *popular* fancies, but in "Science, Scientism, and Anti-Science in the Age of Preposterism," philosopher Susan Haack, the Phi Beta Kappa Romanell professor of the year in philosophy, eloquently takes on the egregious excesses of her colleagues in academe who have replaced genuine inquiry with advocacy "research" and with politically based, often antiscientific, sham "scholarship." It's a wake-up call.



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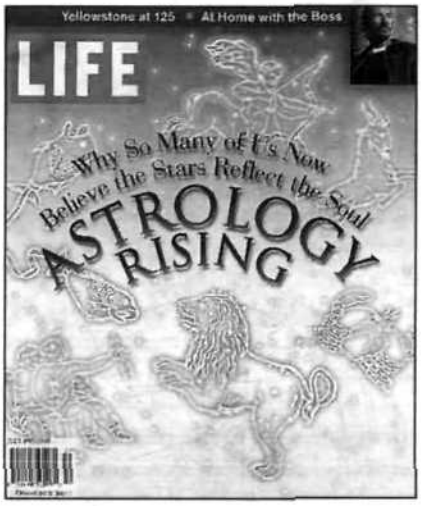
Life Magazine's Star-Struck View of Astrology

On *Life*'s July 1997 cover, spread across pictures of Zodiac signs, are the words "ASTROLOGY RISING: Why So Many of Us Now Believe the Stars Reflect the Soul." The inside cover story is titled "Star Struck: A Journey to the New Frontiers of the Zodiac." The author: someone named Kenneth Miller.

Miller begins by telling how miserable he felt when his first wife fell in love "with a German named Nils." Astrology cheered Miller up. He began buying fashion magazines solely to read their horoscopes. A horoscope-hotline recording by syndicated astrologer Joyce Jillson said the day's lucky color was tangerine. "By chance (or perhaps fate)," Miller writes, "a shirt of that hue lay in my dresser drawer." It was indeed lucky. He put it on for a walk with Julie, a new girlfriend. This led to their marriage.

Intrigued more than ever by stargazing, Miller began to visit top astrologers. He admits that "dozens of scientific studies say it doesn't work," but that didn't faze him. A "physicist-astrologer" named Will Keepin convinced him that astrology had a "scientific basis." The basis? The late Michel Gauquelin's long-discredited claim that eminence in various professions correlates with positions of planets at a person's birth. Miller doesn't tell you that Gauquelin regarded all mainline astrology as rubbish. It's like finding support for a belief that the Earth is flat by reading a book proving its shape is cubical. Miller also became impressed by how physicist David Bohm's emphasis on the interconnectedness of all parts of the universe is also congenial to astrology.

Another astrologer, Karen Helouin, gave Miller a reading in which everything she said hit the mark. She told him he had a need to be of service to people, and that he would have made a good communist. Miller wonders, "Had



I told her about my Maoist phase?"

Other astrologers bowl him over with their accuracy. Noel Tyl caught him "rebelling and doing drugs in college." Tyl detected the crumbling of Miller's first marriage and the success of his second one. He is "euphoric" when Tyl predicts "professional ascendency with reward" by April 1998.

Miller looks up Joyce Jillson. He found her horoscope reading "perceptive." A Vedic astrologer impressed him even though he realized that Hindu astrology uses totally different star patterns from Western astrology. I was surprised he did not consult a Chinese stargazer. Ancient Chinese star signs have nothing in common with either Hindu or Western astrology. If one is valid, the other two are bogus.

Miller is now an enthusiastic convert, "overwhelmed by the readings' torrent of insights. . . . I was amazed at the way it shed light on the soul." A visit to Ray Hyman discombobulated him. Hyman, a psychologist and expert in human self-deception, is given two paragraphs to explain how easily believers validate any readings.

"Hyman infuriated me," Miller adds, but the fury was short-lived. Soon he was seeking "treasures in astrology that no fallacy could ever taint. . . . And there were things in those transcripts that Hyman's theory just couldn't explain."

To further bolster his faith, Miller phoned Karen Helouin to give her several dates to analyze. For 1964 she asked, "Did you move?" He did. She guessed correctly it was an unhappy move. For 1987 she asked if he got married. Yes, it was the year of his first wedding. Miller rates Helouin correct five times out of five. His belief in astrology is now unalterable. "Music is beautiful," he ends his article, "to those who hear."

It has been a long time since I read an essay in a reputable magazine by someone as naive, self-involved, and willfully ignorant as Miller. Are there New Age astrology buffs on *Life*'s editorial staff, or was Miller's article no more than a cynical effort to boost circulation? After all, polls show that almost half of Americans believe in astrology, including a recent president and first lady. In either case, *Life*'s editors should be deeply ashamed for their trashy contribution to our nation's dumbing down.

—*Martin Gardner*

Editor's Note:
The SKEPTICAL INQUIRER *invited* Life *magazine managing editor Jay Lovinger to respond to the criticisms in Martin Gardner's News and Comment article. He did not reply, but the article's author, Kenneth Miller, did. His response, too long to print in full, was on* Life *magazine letterhead. Miller identified himself as "staff writer."*

Here are excerpts:

"No, there are no horoscope buffs among *Life*'s editors. But a primary function of journalism is to report on mass culture, and the fact that almost 50 percent of Americans believe in astrology is certainly newsworthy. . . . The article was to be a piece of personal journalism, a well-established genre in which an author discusses his own experiences—even the occasional bout of credulity!—in the hope of illuminating larger truths. . . .

"I did take the scientific critique of astrology seriously, but . . . I also found it fruitful to judge my subject by other criteria. . . .

"I confess that after having my chart read half a dozen times, I briefly became a true believer and that I was rather put out with Ray Hyman for trying to disillusion me. But as I note on page 52, I then checked my transcripts and found that much of what he'd said about self-deception applied. Nonetheless, his argument didn't strike me as airtight, so I subjected it to an informal empirical trial with Karen Helouin. Her accuracy is almost beside the point. What I found to treasure in astrology was its aesthetically pleasing and psychologically satisfying play of symbols. Music is, indeed, beautiful to those who hear. Mr. Gardner, I submit, has a tin ear."

To which Martin Gardner replies:

With respect to the "beauty" Miller sees in astrology, I confess my ears are made of tin. The solar system is beautiful. The stars are beautiful. Galaxies are awesomely beautiful. But astrology is as ugly as palmistry, phrenology, and reading the future from tea leaves and animal entrails. Its believers have tin brains.

Martin Gardner writes SKEPTICAL INQUIRER*'s "Notes of a Fringe-Watcher" column. His latest book is* The Last Recreations *(Springer-Verlag, Copernicus, 1997).*

TV's Crashed-Saucer Coverup Continues

If the U.S. government could sue producers of TV documentaries for slander and libel, it could easily win a judgment against Hollywood's Associated Television International, which produced "Roswell: Coverups and Close Encounters." The two-hour "documentary" aired June 30 on the Sci-Fi cable channel and was repeated three times during the next week.

The TV show unwittingly revealed that its producer/director, David Doyle, had important evidence that would challenge, if not demolish, the show's central theme of a government coverup. But he, like many other TV producers, opted to withhold almost all of it from viewers rather than be the first to reveal the real coverup. (See my "That's Entertainment! TV's UFO Coverup," *SI,* November/December 1996.)

Doyle taped an hour-long interview with me in Washington, D.C., on May 22. Prior to the taping, I discussed with him the highlights of a number of once "Secret" and "Top Secret" documents that show that no extraterrestrial craft was recovered near Roswell, or anywhere else. I informed Doyle that these documents had never been shown on TV and he could be the first to do so. I provided him with photocopies so he could later study and photograph them close up so viewers could read them.

During my taped interview, for example, I discussed a once "Top Secret" Air Intelligence Report, #100-203-79, dated December 10, 1948—more than a year after the "Roswell incident." It stated that the origin of UFOs was unknown, but the Pentagon suspected that UFOs were Soviet spy vehicles. When Doyle's show aired, a portion of one page of this document appeared on the screen fleetingly—too fast to be read by TV viewers. The narrator (Jonathan Frakes) did not even mention this report or any of its content. And my taped discussion of this revealing report ended up "on the cutting-room floor."

During the interview, I also discussed a once "Secret" briefing document for top CIA officials, dated August 14, 1952, which offered several possible explanations for what UFOs might be. The document included the following: "The third theory is the man from Mars—spaceships—interplanetary travelers. Even though we might admit that intelligent life may exist elsewhere and that space travel is possible, *there is no shred of evidence to support this theory at present.*" During the TV show, a small portion of one page of this CIA document was shown for two seconds. But my taped interview discussion of the CIA document was not used, and the narrator made no mention of its revealing contents.

In the opening segment of "Roswell: Coverups and Close Encounters," I appeared, very briefly, to say: "There is a coverup. After many years of investigation, I am certain that there is a coverup as far as Roswell." It was not until an hour later in the program that viewers could hear my full statement which conveyed quite a different idea: ". . . I am certain that there is a coverup as far as Roswell. *Not by the U.S. Air Force, not by the U.S. government, but by those people who falsely claim the government is covering up. They are the ones that are withholding key information from the public.*"

Narrator Frakes then said: "*Aviation Week* historian [wrong title] Philip Klass believes that a declassified letter to the Pentagon by Lt. Gen. Nathan Twining *might* [wrong] be evidence disproving the Roswell coverup theory" (emphasis added). Then, in my longest comment in the two-hour program, I say: "Here is a letter written by Lt. Gen. Nathan Twining on September 24, 1947 [more than two months after the Roswell incident], *in which he says:* 'The phenomenon reported is something real and not visionary or fictitious.' But what you never see or hear quoted is a later paragraph in that same letter in which Gen. Twining says: 'Due consideration must be given to the following: the lack of physical evidence in the shape of crash-recovered exhibits which would undeniably prove the existence of these objects.' *This letter alone—that comment alone—disproves Roswell.* Because of that, writers of books on Roswell, producers of TV shows, intentionally omit any reference to that."

I suspect that producer/director Doyle included that one segment to demonstrate that I was wrong about TV show producers. More than a dozen pro-coverup Roswell researchers and "wit-

nesses" appeared on the program and were given twenty-two minutes of air time. Four skeptics of a coverup appeared for slightly more than eight minutes. In addition, astronomers Frank Drake of the SETI Institute and the late Carl Sagan appeared briefly to endorse the possibility of extraterrestrial life in the vast universe. This *seemed* to endorse the possibility that an extraterrestrial craft crashed near Roswell. If Drake was asked for his views on Roswell, they, too, ended up on the cutting-room floor. Sagan's segment, filmed in 1983, offered no comment on the Roswell incident.

The commentary by narrator Frakes—which included references to Watergate and Iran-gate but no mention of the once "Secret" and "Top Secret" documents I provided to Doyle (except for the Twining letter)—was strongly biased to convince the average viewer of a government coverup. It *almost* convinced me.

—Philip J. Klass

Philip J. Klass's latest book is The Real Roswell Crashed-Saucer Coverup, *just published by Prometheus Books.*

David Hume Skeptic Exemplar

Every intellectual and social movement has its precursors and its heroes and heroines. Looking back, one author stands out as a key figure in the growth of modern-day skepticism. I am referring to the Scottish philosopher David Hume (1711–1776). Many commentators consider Hume to be the most important philosopher that the British Isles ever produced; he was surely the greatest and most influential skeptic.

Hume's writings had a profound impact in his own day. They contributed significantly to the thought of the French *philosophes* of the Enlightenment and were read by many leaders of the Revolution in America. His popular *History of England* established his reputation as a great writer, though his *Treatise on Human Nature* and *Enquiry Concerning Human Understanding* are his key epistemological works.

Hume attempted to develop rigorous methods of empirical observation for testing claims to truth; and this led him to a devastating critique of speculative metaphysics and theology. His argument concerning miracles provided an antidote to appeals to miraculous, nonnatural, supernatural, and paranormal explanations of phenomena. His analysis of philosophical issues such as causality, free will *versus* determinism, and the design and cosmological arguments for God have had a profound influence on philosophical debates ever since. Many of his critiques of religion were published posthumously in his *Dialogues Concerning Natural Religion,* which he entrusted to his friend and colleague Adam Smith, one of the key intellectual figures of modern economics. Hume described his skepticism as "mitigated." This moderate form of skepticism is not, I submit, nihilistic nor total, but constructive and positive, and it is essential to the process of scientific inquiry.

Hume was a prophet without honor in the Edinburgh of his own day; and he was denied a chair at the University of Edinburgh because of his heretical views. Great efforts are currently underway in Scotland to restore his reputation and to properly appreciate his contributions.

It was with great pleasure that I accepted an invitation this summer to preview a statue of Hume to be erected in Edinburgh in his honor. I traveled to Edinburgh at the invitation of Nigel Bruce, former president of the Scottish Humanist Association and key inspiration for this memorial. The Saltire Society is undertaking the project.

The twelve-foot-high statue will be cast in bronze. Hume is seated, and he holds a blank tablet in his hand (*tabula rasa*). The likeness of Hume is as a younger man; he is dressed in a toga. When I asked the sculptor, Alexander

Paul Kurtz with the partially completed statue of David Hume to be erected in Edinburgh.

Stoddard, why he was not clothed in the apparel of his day, he replied that Hume was a "universal man"—although a child of the Scottish Enlightenment, he has a close affinity with Greek and Roman classical skepticism and speaks beyond his time. The statue will be formally placed on High Street in the center of Edinburgh, near Hume's home.

Two other memorials for Hume are being planned. First, efforts are underway to restore the mausoleum where he is buried. There are also plans afoot to create a "Hume Walk," which would allow visitors to see the various sites in Edinburgh where Hume lived and wrote.

A trip to Edinburgh, for those who have read Hume's works and have profited by them, is an inspiring event. I am pleased to report that the Committee for the Scientific Investigation of Claims of the Paranormal is one of the sponsors of these projects. The Saltire Society currently is seeking contributions of $20,000, in addition to the $200,000 already raised, to bring the mausoleum restoration and "Hume Walk" to fruition.

—Paul Kurtz

Paul Kurtz is the founder and chairman of the Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP).

New Roswell Fragment? The Isotopes Don't Have It

In the hectic closing days of the Roswell UFO celebration, on July 4, a video of a strange piece of silicon was unveiled, and the presenters claimed that this piece supplied dramatic scientific proof that space aliens did in fact crash at Roswell in 1947. The findings are being promoted by Paul Davids, the producer of the *Roswell* movie starring Kyle MacLachlan and Martin Sheen.

A Ph.D. chemist, Russell VernonClark from the University of California at San Diego, stepped up to a microphone and declared that the fragment was extraterrestrial. VernonClark briefly described a series of tests, mainly involving ratios of various isotopes in the sample. (Isotopes of a single element have the same number of protons, and thus the same chemical properties; they have different numbers of *neutrons*, and thus have slightly different masses). VernonClark claimed the ratios he measured were so different from Earthly ratios that the piece could not possibly have come from this planet. After his speech, he quickly left without answering questions.

VernonClark has posted a very brief description of his analysis on his UCSD Web site, at http://www-chem.ucsd.edu/~ruvernon/ (follow links down to subdirectories Odds.n.ends/Analysis). I reviewed his analysis and found several glaring problems. Some were problems of omission—for example, VernonClark pointed to the strange abundances of three isotopes of nickel: Ni-60, Ni-61, and Ni-62. But he failed to even *mention* the most abundant isotope of nickel, Ni-58. If this isotope really was missing, that amazing fact would have helped to clinch the "alien" origin. VernonClark's report was also marred by huge arithmetical errors, most of which he corrected in subsequent posts.

I e-mailed VernonClark to ask him if he had used a control, such as a material of known isotopic content. (This helps ensure the equipment is functioning properly.) I also asked him about the curious fact that his unnamed colleagues reported a 0.11 percent abundance of germanium-75. This isotope is so highly radioactive (the half-life is eighty-three minutes) that even an amount as large as a gram would decay completely in a few days. Its presence in a supposed fifty-year-old artifact is curious, to say the least.

VernonClark did not answer my e-mail for over a month. When he did reply, he confirmed that he did not measure controls. He also said that "the data and possible alternative explanations should have been examined with much greater rigor prior to a public announcement." And he explained the germanium problem by contending that the other researchers doing that test must have confused the reported Ge-75 with other elements with a mass of 75, such as arsenic-75 (the only stable isotope with seventy-five protons and neutrons).

It appears that these researchers, who claim they have proved this object is alien, might not be that experienced at studying ratios of isotopes of the same element. In fact, it appears that they can't even decide which *element* they're examining.

Albuquerque Journal reporter John Fleck dug into the affair in a piece published on July 25. Fleck mentioned some of my criticisms, as well as those of other scientists interested in the case. Fleck interviewed several scientists who said that even if the isotopic analysis holds up, the strange material could easily be manufactured right here on Earth. Purified samples of isotopes can be obtained from labs such as Oak Ridge National Laboratory. If these purified isotopes are chemically mixed with other material, the resultant isotopic ratios can look "out of this world." Several such suppliers were listed under "isotopes" in a *Thomas Register* we had lying around my office.

I suggested similar tests last year, on the fragment that ultimately turned out to be a piece of artist's scrap (*SI*, November/December 1996). Since such results *can* be faked, however, just finding anomalous ratios is not enough to prove an object is extraterrestrial. It appears that such cases need, in Fleck's words, "chain of custody, and multiple lines of evidence." (As an example of such a case, consider the history of some of the meteorites now thought to have been blasted off the surface of Mars.)

VernonClark himself admits in his Internet post: "To put it plainly, it IS POSSIBLE, but expensive to create a material with non-natural isotopic abundances." Now, who would waste good money on something as silly as a Roswell hoax? (That reminds me, didn't Fox pay Ray Santilli lots of money for the rights to "Alien Autopsy"?)

—David E. Thomas

Dave Thomas is an Albuquerque physicist and a SKEPTICAL INQUIRER *consulting editor.*

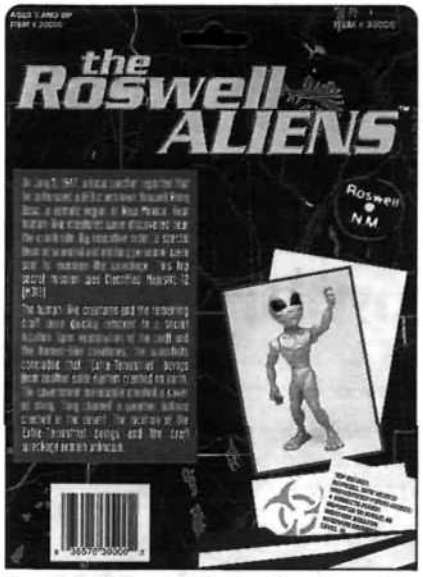
Pseudoscience Hits Toy Stores

Not even toy stores are immune to the onslaught of pseudoscience and popular superstition on the airwaves and newsstands.

In June, a new children's action figure called "The Roswell Alien" took its place on store shelves, right alongside Batman, Luke Skywalker, and G.I. Joe.

The six-inch figure is fashioned in the archetypal image of the modern space alien—short in stature, with oversized head and large black eyes. As an action figure, there is nothing particularly unique about the Roswell Alien—except for the packaging.

Written on the package is a brief account of the alleged Roswell saucer crash. The only problem is that the incident is presented as historical fact. Nowhere in the copy are there any qualifiers to suggest another possible expla-



The new "Roswell Alien" action figure. The packaging presents the story of the "Roswell incident" as historical fact.

nation.

Unlike most children's toys, which depict monsters or superheroes as fictional characters, this product suggests that real-life aliens crashed into the Earth fifty years ago.

"By executive order, a special team of scientists and military personnel were sent to examine the wreckage," the package reports. "This top secret mission was Classified Majestic-12 (MJ12).

"The human-like creatures and the remaining craft were quickly removed to a secret location," the story continues. "Upon examination of the craft and the human-like creatures, the scientists concluded that 'Extra-Terrestrial' beings from another solar system crashed on earth. The government meanwhile created a cover up story."

This may seem like harmless fun, designed to spark the imagination of young minds. But the Roswell Alien establishes a disturbing precedent in toy manufacturing.

As children, most of us believed in ghosts, goblins, and the monsters that lived under our beds. But, in most cases, we could count on the adult world to assure us that the ghosts were not real and the monsters would not attack us while we slumbered.

With the Roswell Alien, kids are getting a very different message. Here, we have a modern myth presented as scientific fact. As the package declares, "*scientists concluded* that 'Extra-Terrestrial' beings from another solar system crashed on earth."

At best, this is highly irresponsible. Children deserve better from us grownups.

"The Roswell Alien" is manufactured by Los Angeles-based Street Players Holding Corporation. The company could not be reached for comment.

—Bill Underwood

Bill Underwood is a freelance writer and a graduate student at Oklahoma State University's School of Journalism and Broadcasting.

UFO Survey Yields Conflicting Conclusions

Space aliens don't exist, yet the government is covering up evidence of their existence. Apparently that's the contradictory conclusion we are supposed to draw from a survey by Yankelovich Partners, a Connecticut marketing research and consulting organization, published in the July 7, 1997, *USA Today*.

Headlined "Do Watchers of *X-Files* Believe?" the survey was a comparison of the beliefs of watchers and nonwatchers of the popular Fox television series, *The X-Files*. But either the survey was flawed, *USA Today* misreported the results, or a hefty number of people think the government is hiding something that doesn't exist.

Although 82 percent of the nonwatchers said the government "is hiding evidence of intelligent life in space," only 45 percent said they believe that there are intelligent beings living on other planets. (Among *X-Files* viewers, 79 percent think there is a coverup and 64 percent think there is intelligent life on other planets.)

Other finds of the survey seemed similarly inconsistent. Among nonwatchers, 66 percent believe a UFO crashed in Roswell, New Mexico, in 1947, yet only 26 percent believe that space aliens have visited Earth. *X-Files* viewers are just as likely to buy the Roswell saucer stories, but the percentage of viewers who think ETs have come to our planet (42 percent) still doesn't come close to the 65 percent who believe that Roswell is a crash site.

— C. Eugene Emery Jr.

Gene Emery writes SKEPTICAL INQUIRER*'s "Media Watch" column.*

Take It from One Who Was There: No Aliens at Roswell in 1947

Most of the following item appeared originally as a letter to the editor in the Salt Lake Tribune *(July 3, 1997) and is printed here with the permission of the author.*

I read the Associated Press report (*Tribune*, June 18) on the UFO incident at Roswell, New Mexico, in July of 1947 with considerable interest. I was based at the Roswell Army Air Field at that time and I was assigned as medical supply officer of the base hospital. The spread and exaggeration, if not outright fabrication, of events surrounding the "incident" have been fascinating and disturbing for me. Conspiracy theories seem to develop a life of their own.

I do not know for a fact whether an alien craft crashed at the Brazel Ranch. It was Mac Brazel who allegedly found the wreckage, not Frank Kaufman and others, as stated in the AP story. Nuclear physicist Stanton T. Friedman has probably done more research on the incident than anyone else I know of, and he is

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Fund for the Future

CSICOP AT THE CENTER FOR INQUIRY

An Unprecedented $20 Million Drive for the

Human beings have never understood the material universe as thoroughly as they do today. Yet never has popular hunger for superstition, pseudoscience, and the paranormal been so acute.

CSICOP and the *Skeptical Inquirer* are leading advocates for skepticism nationally and worldwide. But so much more must be done in the years to come.

Day and night, the Center for Inquiry has become a focus of academic and popular inquiry.

Publishing revenues alone cannot fund the bold outreach today's challenges demand. Hence the Fund for the Future Campaign, a ten-year effort to add 20 million dollars to the Center for Inquiry endowments.* Gifts and endowment income will fund projects including:

Council for Media Integrity

Formed just weeks after its inclusion in the Ten-Year Plan, the Council for Media Integrity will monitor and rebut media programs that convey unfounded claims and mislead the public about science. Members include Steve Allen (chair), Stephen Jay Gould, and many others. CSICOP will invest in electronic infrastructure to facilitate rapid response to irresponsible programs.

Adult Education

The Council cosponsors the Center for Inquiry Institute, which has already expanded its offerings to include a new three-year certificate program in science and skepticism. Sessions are scheduled in Amherst and Los Angeles.

Enhancing Library Resources

The Center for Inquiry's skeptics' library—already the finest of its kind in the world—needs *expanded funding to enlarge its* core collection and add electronic media. Worldwide modem access to the library's catalog is already nearly complete.

*Combined endowment goal of CSICOP and the Council for Secular Humanism, both nonprofit tax-exempt educational organizations.

Steve Allen
Honorary Co-chair

Martin Gardner
Honorary Co-chair

Future of Science and Reason

The New Ten-Year Plan

To continue its leadership in the defense of reason, CSICOP has articulated a Ten-Year Plan designed to:

- *Promote science and reason*
- *Develop public support and participation*
- *Develop The Center for Inquiry as an education and research center*
- *Build up the Committee's resources*

The Center for Inquiry attracts global media attention with scholarly conferences and events like this public "Friday the 13th Superstition Bash."

For the Young

To present skeptics' message more compellingly to the young, CSICOP will develop new materials—ranging from age-appropriate print publications to audio and video cassettes and instructional courseware. Goals include enhanced understanding of science and improved critical thinking skills.

Regional Outreach

With the establishment of The Center for Inquiry - West (Los Angeles), The Center for Inquiry - Midwest (Kansas City) and The Center for Inquiry - Rockies (Boulder, Colorado), giant steps have been taken to enhance direct field service to skeptical activists. Additional regional Centers are planned with expanded calendars of activities.

How Can I Help?

The Center for Inquiry Fund for the Future depends on generous support from each of our readers and friends. Gifts of cash, securities, and other assets are sought. A three-year pledge can make more substantial gifts surprisingly affordable. Many forms of planned giving arrangements can be arranged. All requests will be held in confidence.

Only financial support from skeptics and other friends of science can place the skeptical movement on a firm financial foundation.

At the first World Skeptics Congress in Amherst, New York, participants gave or pledged an unprecedented $201,000 to give the Fund for the Future campaign a vigorous start.

We invite you to make your commitment to the Fund for the Future today. For more information, complete and mail the postpaid reply card.

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convinced there was an alien craft crash at that site. I remain unconvinced.

I am quite certain that no autopsy of any aliens was performed at the base hospital, as depicted in Ray Santilli's video "Alien Autopsy." Recently, I was asked by a Japanese documentary film company to review the video and comment as to its authenticity. I know that no operating room suite, as shown, existed at the base hospital. We had no autopsy room as such.

One report stated that a Maj. Jesse B. Johnson, the base pathologist, conducted the autopsy. There was a physician named Jesse B. Johnson assigned to the hospital at that time. However, he was a first lieutenant and a radiologist, not a pathologist, and was the least likely of any of the medical staff to perform any such procedures.

Another report, attributed to Glenn Dennis, who worked at the Ballard Mortuary in Roswell, states that he (Dennis) had talked to a military nurse, one Naomi Marta Selff, about the autopsy and she had shown him a sketch she had made of the aliens. There was no nurse by that name assigned to the base hospital at that time, and further research has shown there is no record of a nurse by that name in the Army Air Corps.

I talked to Maj. Jack Comstock, who was the base hospital commander at the time, prior to his recent death and asked him if he had any knowledge of an autopsy of aliens at that time. He said no, not to his recollection. Dr. Comstock lived in the BOQ next to the hospital and would have been the first one contacted if such a request had been made. Also, neither he nor I were contacted concerning any small caskets for use in transporting remains. (As medical supply officer, it would have been my responsibility.)

Glenn Dennis is quoted in a number of books on the Roswell incident as referring to the Base Mortuary and the Base Mortuary Officer. The fact is, there was no Base Mortuary at Roswell AAF. He is also quoted as saying the mortuary was located next to the Hospital Infirmary. The Base Hospital treated short-term patients only. Any serious illness or injury was routinely air evacuated to a regional or general military hospital for long-term care. Hence, there was no need for either a pathologist or a mortuary.

For anyone interested, I have included several links to various Roswell sources on my Web site (http://www.inconnect.com/~lorenzok/index.html). A word of caution, however. Beware of anyone who claims to have the "True Story of Roswell."

—Lorenzo Kent Kimball

Lorenzo Kent Kimball is a professor emeritus of political science at the University of Utah. □

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The Battle Between Political Agendas and Science

Gwen A. Burda

On June 6, 1997, in Boulder, Colorado, hailstones fell from the sky and a tornado touched down for the first time in Boulder's history. But this was not the only first. In and around Boulder, people were preparing to gather at the University of Colorado's Fiske Planetarium for the opening ceremonies of a conference titled "Rational Feminism Explores the Gender Politics of Science."

The conference, which had its opening ceremonies June 6 and proceedings all day June 7, was the first meeting of the new Rational Feminist Alliance of CSICOP. The Alliance was founded last year to explore issues arising from certain irrational impulses of feminism.

The conference was also the first official event sponsored by the new Center for Inquiry–Rockies, a new regional center of CSICOP. (Cosponsors were the Rocky Mountain Skeptics, the UC Boulder anthropology department, and CSICOP.) This Center will be under the directorship of Bela Scheiber, founder of the Rocky Mountain Skeptics and a member of CSICOP's Executive Council, and Carla Selby, proven skeptical activist. Scheiber and Selby also served as conference co-chairs. The Center for Inquiry–Rockies joins other regional centers in Los Angeles and Kansas City, as well as the CSICOP headquarters in Amherst, New York (Center for Inquiry–International), and a center in Moscow, Russia. The primary objective of the new Rockies center will be to actively promote critical thinking and rationality in the region through conferences, informal meetings, workshops, and interaction with the media.

Opening remarks were made by **Barbara Vorheis**, chair of the UC Boulder anthropology department, and **Paul Kurtz**, CSICOP founder and chairman, whose address was read in his absence. Kurtz applauded the efforts of the conference organizers for bringing the topic of gender politics and the relationship between feminism and science into an open forum for discussion. He expressed his agreement with the basic feminist critique of society, but also bemoaned the "frontal assault on science" of many radical feminists. Kurtz said we cannot lose sight of the "rigorous and objective standards" of the scientific methodology—standards that transcend gender—and that men and women must work together to extend the frontiers of knowledge.

The first session addressed "Misuses of Therapy." **Gina Green**, a behavior analyst specializing in autism and other developmental disabilities and Director of Research at the New England Center for Children, spoke on the "disability politics" of facilitated communication (FC). FC is the controversial technique whereby a child with a severe communication disability is held at the hand or arm by a person called the "facilitator" and, with the facilitator, points to sequences of letters to spell out messages that are supposedly the child's own.

Conference speakers Carol Tavris, left, and Eugenie Scott. (Photo: Huntley Ingalls)

Green said that, despite its utter failure in controlled tests and having been dubbed a "classic example of pseudoscience," FC has succeeded as a "social movement." Proponents of FC claim that autistic people don't actually have cognitive and communication deficits and are "trapped inside uncooperative bodies." Those who are critical of FC are seen as "negative" and "narrow-minded" and as denying impaired persons their "right to communication."

Debbie Nathan, a freelance journal-

Gwen A. Burda is managing editor of SKEPTICAL INQUIRER.

Conference co-chair and new executive director of the Center for Inquiry–Rockies, Bela Scheiber. (Photo: Huntley Ingalls)

ist based in El Paso, Texas, and coauthor of *Satan's Silence: Ritual Abuse and the Making of a Modern American Witch Hunt*, spoke on the cultural assumptions behind the phenomenon of false ritual sexual abuse accusations.

In our culture, said Nathan, it is assumed that children are innocent, pure, asexual; that sex is evil; that the worst thing that could happen to a child is to be defiled by sex; and that children don't have adult motivations, such as revenge, for false accusations. Thus, a child who is questioned about sex is incapable of lying about it. Nathan claims that empirical studies of childhood behavior have shown these assumptions about innocence and asexuality to be false. Also, sexual abuse is assumed to be much more horrific than physical abuse and emotional neglect, but the latter are, in fact, far more prevalent and have more devastating long-term effects. By focusing on the sexual abuse component, researchers often ignore other variables in abuse cases, such as emotional neglect, physical abuse, general family dysfunction, and poverty.

Nathan speculated that feminists have supported paranoid sexual-abuse social movements because such problems as wife beating and rape are harder to get attention and outrage for. They have linked themselves to these causes to get support for less popular women's issues. Child sex abuse, said Nathan, "stands for an array of feminine complaints."

Barbara Eisenstadt, psychologist, clinician, and international trainer in the fields of addiction, women's treatment, and group therapy, spoke about our "culture of addiction." She warned that society is programming people to become addicted and promoting addictive behavior. She believes this is politically based because of the money to be made in keeping people addicted and convincing them they need treatment for their addiction. Many psychologists are furthering this by labeling people and pathologizing all kinds of behavior.

Archaeologist **Linda Cordell**, professor of anthropology at UC Boulder and director of the University Museum, opened the second session, devoted to the "Misuse of Archaeology." Cordell gave an example of the often subtle gender biases that can exist in archaeological research. She showed how research into gender roles in past cultures has actually revealed, in at least one case, certain gender biases and possible political agendas on the part of the archaeologists, men and women alike, doing the research.

Carla Selby's talk was rooted in her personal experiences as a graduate student in anthropology in the late 1960s at UCLA, working under the archaeologist Marija Gimbutas. Gimbutas advanced the notion of an ancient, all-encompassing, goddess-worshipping, matrifocal culture, extending throughout the entire continent of Europe from 40,000 years ago up to Greek and Roman times. Selby said that in the mid to late 1960s, Gimbutas's myth of the all-encompassing goddess culture served as a powerful rationale for women's empowerment and gave "the emerging feminist movement a mythological underpinning without peer."

Speaking on multiculturalism in archaeology, **Bernard Ortiz de Montellano**, professor of anthropology at Wayne State University and author of *Aztec Medicine, Health, and Nutrition*, examined the theory accepted by many African-Americans, that black Nubian rulers of the twenty-fifth dynasty in Egypt came to the New World in 700 B.C. and were responsible for most of the great cultural achievements in Mesoamerica, including the calendar, mummification, pyramids, crops, and arithmetic.

This theory, claims Ortiz de Montellano, is being taught in schools, particularly in urban areas with high African-American populations, despite the fact that not one genuine African or Egyptian artifact has ever been found in the New World and that the arguments and evidence of its proponents are seriously flawed. Ortiz de Montellano sees the theory as politically motivated by the desire to establish a black presence of influence in the early history of the New World.

Carol Tavris, a social psychologist, CSICOP fellow, and author of the book *The Mismeasure of Woman*, delivered the keynote address with a unique combination of wit and incisiveness.

Tavris said that in the early days of the feminist movement, the politics of feminism was not at odds with science. In psychology, for example, feminists wanted to achieve equality for women in the profession and in society, and to correct the pervasive male bias that existed in the field—in its methods, theory, and findings. These goals served the aims of science.

Before long, however, science and feminist politics began to conflict and two trends emerged: cultural feminism, which claims that women are not just *different* from men, but *better*; and the rise of antiscientific attitudes and "subjective ways of knowing."

The appeal of the "woman as superior" stereotype is understandable, said Tavris, for anyone who has experienced the "woman as inferior" stereotype. (She related the story of a female friend who entered college in 1970 in physiological psychology. On the first day of class, her male professor announced, "I will not teach this course with a pair of ovaries in the room," and left.) But studies of actual men and women show that human qualities, bad and good, are evenly distributed across the sexes. She sees the antiscience trend as the result of a misunderstanding of the original feminist critique of science. From the fact

that there were biases in science, many feminists jumped to the conclusion that science is altogether biased and must be thrown out wholesale as a way of obtaining knowledge.

According to Tavris, the grassroots feminist therapy movement, which began as a corrective to male biases in psychiatry and psychoanalysis, has become, in some quarters at least, a "vested interest with its own unmistakable female bias." And in the name of feminist therapy, "the scientifically illiterate perpetrators" of satanic ritual abuse and recovered memory syndrome, for example, have become "just as tyrannical as any of the males they have overthrown."

Kicking off the third session, **Elizabeth Loftus**, professor of psychology and adjunct professor of law at the University of Washington, Seattle, spoke on the repressed/recovered memory controversy. Loftus, who has testified in numerous court cases as to the malleability of memory, described the general repressed/recovered memory scenario. Typically, a woman goes to a therapist with a set of symptoms. She is told by the therapist that everyone he or she has seen with those symptoms has had a history of sexual abuse, and "I wonder if you do too." The therapist proceeds to "ferret out" the past abuse.

The victims of false "recovered" memories are many, said Loftus. Patients are diverted from their real problems and real solutions, families are torn apart, the reputation of the mental health field is hurt, and large sums of money are spent. Finally, false accusers trivialize the experiences of real victims and cause them greater suffering.

Bela Scheiber presented on therapeutic touch (TT), which he said grew out of the "human caring" movement among nurses in the 1970s. Nurses at that time felt they were being marginalized in the health care profession and becoming obsolete. They sought to create a profession with "its own truths." In opposition to scientific medicine, which was cold and impersonal, the theory of human caring emerged as nursing's own unique contribution to the health industry.

TT is the one element of the human caring paradigm that "presents itself as scientific," said Scheiber. He warned that if TT is established as "scientific," it will open the door for other forms of alternative medicine predicated on "energy fields" to gain public approval, and "causality can be thrown out."

In the final session of the conference, **Paul Shankman**, associate professor of anthropology at UC Boulder, spoke about cultural relativism and its evolution from a powerful anthropological research tool, which asked researchers to temporarily suspend moral judgment in order to understand cultures on their own terms, to its "lapse into moral relativism and epistemological relativism." If each culture has its own way of knowing and its own completely unique set of values that others cannot understand, cross-cultural understanding is rendered impossible, said Shankman. Also, extreme relativism overly romanticizes culture and assumes that all cultural practices deserve respect simply because they are "out there."

"Used properly," concluded Shankman, "relativism can lead to better understanding and possibly greater objectivity. Misused, it can lead to moral paralysis and an end to a rational approach to cultural differences and similarities."

Eugenie Scott, physical anthropologist and director of National Center for Science Education, as well as a CSICOP fellow and Executive Council member, addressed the audience on the misuse of scientific evidence by creation scientists. An expert on the creation/evolution controversy, Scott said her concern is not with religious beliefs per se, but rather when people involve science to support their beliefs and misuse science in doing so. Then, scientists must speak out.

Creation scientists often use old, out-of-date scientific facts that "support" their theories, ignoring new evidence that has come since. And they use selective facts, taking them out of context. For creation scientists, concluded Scott, ideology is considered superior to evidence.

After dinner, **Hazel Barnes** addressed

Speakers Bernard Ortiz de Montellano and Hazel Barnes. (Photo: Huntley Ingalls)

conference attendees. Barnes is a professor emerita of classics at UC Boulder and noted translator of Sartre's *Being and Nothingness.*

Barnes stated that, male or female, we are all human, and *human* and *humanity* are meaningful terms. In the midst of gender battles, we must remember our humanity—but not in the sense of a predetermined human nature, but in Sartre's sense of "humanity making itself." She also cautioned skeptical inquirers to remember to keep the "inquiry" part right, saying we want to "install reason where there is irrationality," but not to reject truth because it is embedded in a context that we feel is not truth.

If one complaint could be made about the conference, it is that many of the topics (at least half) did not deal with the stated theme: "the gender politics of science." There were talks on disability politics, multiculturalism, creation/evolution politics, and others, which, while important, fascinating, and thoroughly enjoyed by conference participants, were far off from the stated purpose. Anyone looking specifically to discuss gender politics in science may have been, at the very least, a bit confused. However, this did not seem to concern either participants or speakers. In fact, "complaints" were practically nonexistent. The first conference of the Rational Feminist Alliance of CSICOP was deemed by all to be a success, with many participants and speakers standing up at the final open forum session to testify to their satisfaction and their commitment to attend future conferences. □

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Intelligent Design and Phillip Johnson

In November 1996 more than 160 scientists and scholars converged on Biola University, in La Mirada, California, for the first annual conference of a movement called *intelligent design*. Its promoters are theists with views ranging from conservative Christianity to a philosophical theism unconnected with any religion.

Intelligent designers must not be confused with ignorant Christian fundamentalists who persist in believing that Earth and all its life were created about ten thousand years ago, in six literal days, and that fossils are relics of life destroyed by a worldwide flood. Many proponents of intelligent design (ID) have no quarrel with an ancient Earth. They accept the fact that life evolved over millions of years from simple one-celled forms in Earth's primeval seas. Their quarrel is only with the notion that evolution occurred without God's guidance.

On the other hand, many associated with the ID movement are unashamed "young Earthers." Paul Nelson, who edits the ID newsletter *Origins and Designs*, is a fervent "young Earther," as is Nancey Pearcey, a featured speaker at the Biola conference. "Old Earthers" are embarrassed by these fundamentalists in their midst, but do their best to downplay their influence.

Two developments in modern cosmology have played strong roles in the rise of the movement. The big bang suggests a moment of creation in which the entire history of the universe, including the eventual emergence of you and me, existed potentially in the properties of a small number of fundamental particles and their fields. The other driving force is the strong anthropic principle. It asserts that the universe could not have permitted life, or even the formation of suns and planets, unless some dozen basic constants of nature were extremely fine-tuned. In brief, IDers argue that modern cosmology implies a transcendental Designer. As physicist and pantheist Freeman Dyson memorably put it, "The universe in some sense must have known that we were coming."

IDers go much further than this. In a raft of impressive books, including the recent *Darwin's Black Box* (1996) by the Roman Catholic biochemist Michael Behe (his name rhymes with *tee-hee*), they contend that Darwinism has died. By "Darwinism" they mean the belief that evolution operates solely by random mutations and natural selection. In a narrow sense, of course, Darwinism long ago was modified by the discovery of mutations. The modern theory of evolution incorporates genetics and all other relevant findings of twentieth-century science. Darwin was a Lamarckian who accepted the now-abandoned notion of the inheritance of acquired traits.

In the last few years, many prominent political conservatives have defended ID. Irving Kristol, a firm believer in the God of Israel, has been attacking Darwinism for decades. His views are shared by his wife, Gertrude Himmelfarb, who in 1959 even wrote a biography of Darwin. Robert Bork, in *Slouching Towards Gomorrah* (1996), cites Behe as having proved that "Darwinism cannot explain life as we know it. . . . Religion will no longer have to fight scientific atheism with unsupported faith. The presumption has shifted, and naturalistic atheism and secular humanism are on the defensive."

In its June 1996 issue, the conservative journal *Commentary* featured "The Deniable Darwin," a spirited defense of ID by David Berlinski, a mathematician who more recently published a popular introduction to calculus. "An act of intelligence is required to bring even a thimble into being," he wrote; "why should the artifacts of life be different?"

Pat Buchanan, a right-wing Catholic, denies evolution entirely. He has attacked it in his newspaper columns and, in a 1996 television interview, said something to the effect of (I don't have the exact quote), "You may think you're descended from a monkey, but I don't." Of course, humans are not descended from monkeys, a common misconception.

Martin Gardner's latest book is The Last Recreations *(Springer-Verlag, Copernicus, 1997), a collection of twenty-three of his* Scientific American *columns from the last seven years before his retirement from the magazine in 1981.*

Phillip E. Johnson, author of *Darwin on Trial.*

The most influential book defending ID is Phillip E. Johnson's *Darwin on Trial* (InterVarsity Press, 1991, revised 1993). William Buckley had Johnson on his television show in 1989, and his book was reviewed with high praise in Buckley's *National Review* (April 19, 1991). The same magazine (April 22, 1996) allowed Johnson to do a hatchet job on Carl Sagan's *The Demon-Haunted World.* The equally conservative *New Criterion* (October 1995) let Johnson blast Darwinian Daniel Dennett's *Darwin's Dangerous Idea.*

Obviously I cannot comment here on all the many recent books by IDers, so let me focus on *Darwin on Trial.* Johnson is a mild-mannered, affable law professor at the University of California at Berkeley. He should not be confused with Philip (one *l*) Johnson, the eminent architect who designed Manhattan's AT&T building and televangelist Robert Schuller's Crystal Cathedral, in Garden Grove, California.

Although today's evolutionists all agree on the fact of evolution, they squabble over the mechanisms by which it operates. One major rift is between the gradualists, who follow Darwin in emphasizing slow change, and the "jump" theorists, notably Stephen Jay Gould, who stress long periods of stasis for many life forms, broken by periods of rapid change. By "rapid" they mean changes taking place by incremental mutations over tens of thousands of years—mere blips in geologic time.

Johnson is good in detailing these controversies. He takes them to bolster his view that there are dark mysteries about how life evolved—wide gaps that can be filled only by creative acts of God. He fully grants that random evolution occurs trivially within a species—the diversity of dogs, for example—but denies that new species can arise unless somehow directed from above. His fundamental claim, one stressed by all opponents of evolution from Darwin's day to now, is that structures as complicated as eyes and wings have no survival value unless they appear suddenly and fully formed. Intermediate stages, he falsely insists, are not in the fossil record and simply did not exist.[1]

It is strange that nowhere in his book does Johnson mention the British biologist St. George Mivart. Mivart spent a lifetime trying to persuade his church—he was a liberal Catholic—that its opposition to evolution was as monstrous a blunder as its earlier opposition to Galileo. Mivart argued in *The Genesis of Species* (1871), a book Darwin took seriously, that God's help is needed to explain transitions to new species, and especially for infusing an immortal soul into the first human bodies. All of Johnson's fundamental objections to Darwinism are in Mivart's old book. Mivart was excommunicated and denied a Christian burial. Ironically, his approach to evolution has now been officially endorsed by Pope John Paul II and is held by almost all Catholic theologians.

Mivart was the first major scientist to emphasize that eyes and wings are too complex to have evolved by slight modifications, and that such structures must appear suddenly because earlier incipient stages would have no survival value.

From Mivart's day until now, creationists of all stripes have monotonously asked, "What use is half a wing?" In his popular book *The Blind Watchmaker,* Richard Dawkins answered as follows:

> There are animals alive today that beautifully illustrate every stage in the continuum. There are frogs that glide with big webs between their toes, tree-snakes with flattened bodies that catch the air, lizards with flaps along their bodies; and several different kinds of mammals that glide with membranes stretched between their limbs, showing us the kind of way bats must have got their start. Contrary to the creationist literature, not only are animals with "half a wing" common, so are animals with a quarter of a wing, three quarters of a wing, and so on. The idea of a flying continuum becomes even more persuasive when we remember that very small animals tend to float gently in air, whatever their shape. The reason this is persuasive is that there is an infinitesimally graded continuum from small to large.

Similar arguments, detailed by Darwin himself, give equally plausible conjectures about how eyes could slowly evolve independently, in many different species, from light-sensitive spots on the skin. Although Johnson quotes Dawkins's scenarios for the gradual development of eyes and wings, he calls them speculative "fables" having no supporting evidence. "No one has ever confirmed by experiment that the gradual evolution of eyes and wings is possible." Dawkins would strongly disagree. He has an eloquent chapter on the multiple evolutions of the eye in *A River Out of Eden* (1995).

I found it also curious that Johnson never refers to the Dutch botanist Hugo de Vries, the man who coined the word *mutation.* De Vries argued persuasively, and for a brief time won many followers, that every new species appears "suddenly" as a result of a single macromutation in one generation.

When I finished Johnson's book, I was less interested in his moth-eaten objections to Darwinism than in what he would put in its place. On this all-important matter he is infuriatingly silent. There are four possibilities:

1. Johnson agrees that evolution operates by slight mutations followed by natural selection, but thinks God produced all the favorable mutations. I rule this out because Johnson constantly stresses the "abrupt" appearances of new species, with no transitional earlier forms.

2. Johnson thinks that new species, of which there are millions, emerged suddenly as a result of God-caused, massive mutations.

3. Johnson thinks that God intervened only in the creation of life and in

producing massive mutations for broad classifications of life, such as plants, reptiles, mammals, fish, birds, and, of course, humans.

4. Johnson thinks that, at spots in the history of life, God created by fiat new life forms that had no ancestors. This is the view defended by many creationists who accept an ancient Earth but want to follow Genesis (assuming each "day" to be a long period of time) in having God perform thousands of miracles along the way.

In his books and writings, Johnson has steadfastly refused to explain how he thinks evolution crossed all those mysterious gaps in the fossil record. He sheds no light on what he thinks occurred when the gap between human and apelike creatures was bridged. Were there an Adam and Eve, or many Adams and Eves, created from the dust of the Earth as Genesis tells? (In one of the Bible's two versions of creation, Eve was fashioned from Adam's rib, a miracle taken to be literally true by Jerry Falwell and other fundamentalists.) Or did God merely infuse souls into soulless animal bodies?

Please, Mr. Johnson, answer plainly some simple questions. Did the first mouse have a mother? Did the first humans have navels? If so, were they suckled and reared by beasts? Why did God put nipples on males?

It seems to me unfair for Johnson to lambaste evolution so fiercely without letting us in on what he thinks, or at least suspects, should replace it. It's like writing a book denying that Earth is round but never indicating what shape you think it is. Hoping to gain some answers to these questions, I exchanged a dozen letters with Johnson. He flatly refused to tell what variety of creationism he espoused. His reason? *Darwin on Trial* was intended only as an attack on godless Darwinism. He saw no need to reveal what should go in its place.

In a 1992 lecture recorded on videotape, replying to a question, Johnson admits that IDers have contradictory opinions on how God intervened. He expresses his hope that after Darwinism has been thoroughly discredited, as he is certain it soon will be, a "paradigm shift" will occur and scientists will be free to search for empirical evidence of just when and how God shoved evolution along. It's possible, I suppose, that Johnson has no strong opinion about this question.

I did discover that Johnson is an evangelical Presbyterian. But how far does he go in accepting New Testament miracles? I wrote to ask if he believed in the virgin birth, that Jesus raised Lazarus from a decaying corpse, or walked on water, or turned water into wine. Again, he refused to answer, though he did say he believed in Jesus' Resurrection, and that acceptance of other biblical miracles offered no problem.

Johnson's second book, *Reason in the Balance* (InterVarsity Press, 1995), is mainly an attack on atheism, though it includes a chapter in which he again bashes Dawkins. As in his earlier book, he never lets us know whether he thinks new species appeared as a result of massive mutations directed by the Lord, or whether he thinks God created life forms that had no ancestors.

I was startled by a footnote (page 257) in which Johnson says he greatly admires my religious novel, *The Flight of Peter Fromm* (available in paperback, Prometheus Books), even though it is an attack on Christianity. He cannot, however, comprehend how I can hold a "naturalistic worldview" and at the same time profess a belief in God.

Easy. Unlike Johnson, I am not shy about disclosing my basic convictions. I believe, by an emotional leap of faith, in a "wholly other" deity, utterly inscrutable to our little finite minds. I believe there are truths as far beyond our grasp as calculus is beyond the grasp of a cat. Because I also regard God as immanent in nature, we can say metaphorically that God both created and upholds the universe. I do not believe in what I call the "superstition of the finger"—the notion, to me close to blasphemy, that God finds it necessary at intervals to abrogate natural laws by injecting a finger into the universe to tinker with it. Newton not only was sure that God created the universe and all its laws in six days, he also believed it was necessary for God to periodically adjust the paths of planets to keep the solar system operating smoothly.

If Johnson does not share this Newtonian belief, why is he unable to grant that chance, combined with natural laws, are God's method of creation? I suspect it is because of his hidden agenda to defend conservative Presbyterianism. Regardless of Einstein's animadversions, chance is not a dirty word. It is absolutely and beautifully essential in quantum mechanics.

Please, Mr. Johnson, answer plainly some simple questions. Did the first mouse have a mother? Did the first humans have navels? If so, were they suckled and reared by beasts? Why did God put nipples on males?

I sometimes fancy that quantum laws provided the only way, or perhaps the best way, God could bring about a monstrous universe capable of generating, after billions of years, intelligent life. The amazing thing is that an unconscious watchmaker, oblivious of any overhead plan, can actually work so well. Otherwise you would not be here to read these words.

One of Darwin's bitter crosses was the never-failing Anglican orthodoxy of his wife. In spite of her tearful entreaties, he abandoned his Christian beliefs early on, and eventually, after the death of his daughter Anne, lost faith in God entirely. However, in 1860, a year after the publication of his *Origin of Species*, Darwin defended intelligent design in a letter to Asa Gray:

> I see no necessity in the belief that the eye was expressly designed. On the other hand, I cannot anyhow be contented to view this wonderful universe, and especially the nature of man, and to conclude that everything is the result of brute force. I am inclined to look at everything as resulting from designed laws, with the details, whether good or bad, left to

> the working out of what we may call chance. Not that this notion *at all* satisfies me. I feel most deeply that the whole subject is too profound for the human intellect. A dog might as well speculate on the mind of Newton.

I couldn't say it better.

By far the harshest criticism of *Darwin on Trial* is a review by Stephen Jay Gould in the July 1992 *Scientific American*. Another excellent review, by anthropologist Eugenie C. Scott, appeared in *Creation/Evolution*, vol. 13 (1993), pp. 36–47. She concludes: "*Darwin on Trial* deserves to be read by scientists, not for its scientific value, which is negligible, but for its potential social and political impact."

Johnson's latest book, just published, is *Defeating Darwinism by Opening Minds* (InterVarsity Press, 1997). I have not yet read it, but an ad in the publisher's catalog quotes Michael Behe: "Phillip Johnson is our age's clearest thinker on the issue of evolution and its impact on society."

Note

1. There are thousands of "missing link" fossils, and every year more are found. Examples are the stages between reptiles and mammals, between reptiles and birds, between land mammals and whales, between horses and their progenitors, and between humans and their extinct apelike ancestors. The so-called fossil "gaps" are partly due to the rarity of conditions for fossilization and to the relatively rapid series of mutations emphasized by Gould and his associates. □

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Miraculous Rose Petals?

It has long been common, especially within the Catholic tradition, to discover faces of holy personages in random patterns and to suggest these are miraculous. In my book *Looking for a Miracle* (Nickell 1993), and in a recent article in *Free Inquiry* magazine (Nickell 1997), I recounted several of these including the famous image of Jesus discovered in the skillet burns on a New Mexico tortilla in 1978. Usually, these simulacra are the result of the ink-blot or picture-in-the-clouds effect: the mind's tendency to create order out of chaos. On occasion, however, they are faked.

On Good Friday, 1995, when I appeared on a special live episode of *Oprah* to discuss miracles, I met a daughter of Maria Rubio, the woman who had discovered the tortilla Jesus. Afterward, as we were waiting in a limousine for a ride to the airport, I also talked with a self-styled visionary who had been on the show. She showed me a "miraculous" rose petal that bore a likeness of Jesus, one of several such items that supposedly came from the Philippines. Examining the petal with my illuminated Coddington magnifier (a penlighted loupe), I was suspicious and asked to borrow the object for further study (see Figure 1).

I subsequently examined the rose petal by viewing it with transmitted light, using a fluorescent light box and a stereomicroscope (Figure 2). I noted that everywhere there were markings there was damage to the rose petal, resembling hatch marks made with a blunt tool (Figure 3). In contrast, ordinary rose petals had no such markings (see Figure 4, top right).

However, I found that faces could easily be drawn with a blunt stylus (Figure 4, top left). I obtained dried rose petals, rejuvenating them with boiling water, then smoothing out the wrinkles on the surface of a light box and drawing the requisite pictures. They have characteristics similar to the "miraculous" one (Figure 4, bottom).

Figure 1. Rose petal with "miraculous" portrait of Jesus.

Figure 2. Author conducting examination of rose petal in new CSICOP laboratory.

As this case shows, paranormal claims are not solved by assumptions (e.g., that rose petals have mottled patterns that could yield a facial image) but rather by investigation on a case-by-case basis.

Reference

Nickell, Joe. 1993. *Looking for a Miracle: Weeping Icons, Relics, Stigmata, Visions and Healing Cures*. Amherst, N.Y.: Prometheus Books.

———. 1997. In the Eye of the Beholder. *Free Inquiry* 17 (2): 5. □

Figure 3. Facial markings constitute damage, resembling stylus marks.

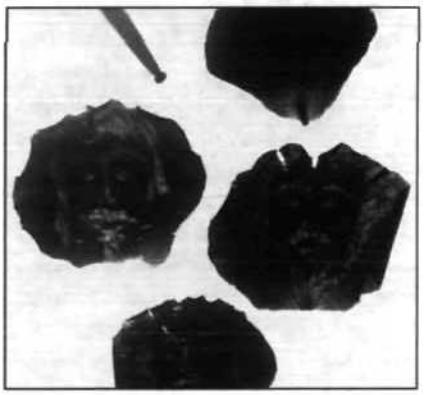

Figure 4. An ordinary rose petal (top right) lacks markings, but a stylus (top left) can be used to produce faces such as the three shown (bottom).

C. EUGENE EMERY JR.

Illusions of Authenticity

Welcome to a world where truth is a relative concept, the "evidence" is carefully selected to show one side, and people are asked to "decide for themselves," even as the key facts needed to make a rational decision are being withheld from them.

Welcome to the world of the Fox Television Network.

The folks who brought Americans the "Alien Autopsy" special in the summer of 1995—and then responded to widespread questions about the authenticity of the "autopsy" footage by shamelessly recycling the material for three more specials—spent the summer of 1997 promoting more pseudoscience.

Consider "UFOs: The Best Evidence (Ever Caught on Tape)," broadcast July 28. Hosted by *Star Trek*'s Jonathan Frakes, it showed videotape of alleged UFOs and asked, "Are we seeing alien craft, secret military vehicles, or clever hoaxes? You decide for yourself."

It then proceeded to bury viewers with tantalizing video clips of nighttime lights and objects floating in the air. All of the footage was so brief, all of it so out of context, it was virtually impossible for anyone to make an independent judgment. With a few exceptions, the show presented experts who had convinced themselves that the images were truly UFOs, as Frakes periodically threw in lines like, "It is unlikely they are hoaxes."

It's easy to preserve the mystery surrounding a UFO sighting if you don't look too closely.

It's easy to preserve the mystery surrounding a UFO sighting if you don't look too closely.

Betty Hill, the godmother of UFO abductees, once showed me pictures of mysterious blobs she had photographed with a movie camera in the night skies near her New Hampshire home. But when I asked to see the original film, the UFOs images turned out to be imperfections on the emulsion of individual frames of the movie.

A movie that allegedly showed a cylindrical UFO moving across the skies of Woonsocket, Rhode Island, didn't reveal its true nature until I saw the whole film. Then it became obvious that the same wind that was moving the trees was also making the object bob up and down like a paper towel tube suspended on a wire running between two trees.

A shape-changing UFO caught by a man in Cranston, Rhode Island, became less mysterious when I watched other parts of the tape and discovered that the video camera had an automatic focusing system that made the pinpoint lights of a distant plane turn into a fuzzy blob whenever the branches of a nearby tree entered the foreground.

But "UFOs: The Best Evidence" never offered that kind of context to the 9.9 million viewers who tuned in that night. Instead, they got quick, often repeated, video clips of "mysterious" objects.

The clips were so brief and repeated so often, one might wonder if the producers were intentionally withholding other parts of the video that might suggest a hoax or a misidentification.

For example, in the nighttime clip of a UFO moving through the skies of Gulf Breeze, Florida, only a tiny fraction of the original video was shown. In the longer version I saw years ago, the "UFO" moved back and forth as if suspended on a pole or hanging from a wire.

They showed a video from inside the cockpit of the Apollo 11 moon landing, where it seemed clear from the total pattern of moving lights on the window that the "UFOs" were caused by lens flare, a reflection off the window, or some other natural phenomenon. A down-to-earth explanation was easy enough to demonstrate. "UFOs: The Best Evidence" chose not to.

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A Canadian UFO video looked to me like a fire truck or police car with a flashing light on top, with two cars off to the side. You could see the backlit bushes (indicating that the object wasn't in midair at all) and the strobe light reflecting off a metal roof. In one of its few brushes with skepticism, the show reported that an investigator with the Royal Canadian Mounted Police had concluded that the object was a helicopter. UFO believer Bruce Maccabee was immediately brought in to characterize that explanation as "ridiculous."

A UFO reportedly spotted in Midway City, Florida, in 1993, looked *suspiciously like a helicopter with a* searchlight. You could even make out what appeared to be the wire frame of the tail's superstructure. Yet host Frakes solemnly intoned: "The government continues to deny the very existence of UFOs despite startling evidence caught on tape."

A UFO videotaped during a solar eclipse in Mexico could easily have been a blimp photographed from a distance, its shape distorted by the limited resolution of the camera after the image was over-magnified. The unsteady hand of the cameraman was construed as erratic "movements" by the craft. UFO proponents claimed that the object left a reddish "trail" as it moved, a trail that was probably an artifact of the video camera; the color sensors that register red apparently didn't reset as quickly as the green and blue sensors, which could explain why the bright object left a red ghost at its last position.

The show was produced and written by Robert C. Kiviat, the same man who gave us the "Alien Autopsy" show (which was rerun the night before this UFO show). Two nights later, on July 30, Fox let Kiviat loose again with "Prophecies of the Millennium," which reported that "an increasing number of experts" are forecasting an end to humanity's reign in the year 2000.

"These warnings are not ravings from madmen shouting, 'The end of the world is at hand,' but carefully considered reports from prophecy scholars representing all walks of life," said host Edward James Olmos.

The program went on to quote Edgar Cayce, Nostradamus, and biblical prophecies that reportedly show that, in fact, the end of the world is at hand.

Just as "UFOs: The Best Evidence (Ever Caught On Tape)" was spiced with the barest hints of skepticism, "Prophecies of the Millennium" was sprinkled with weasel words or carefully crafted phrases designed to give the illusion of objectivity.

"Why should we listen to prophets who warn the world may end? Believers say just look at their track record," Olmos told viewers. Nonbelievers, of course, never got the chance to give a detailed rebuttal. "Nobody had a better record for predicting future events than Nostradamus," Olmos said. That's true, but only because nobody, including Nostradamus, has been very good at forecasting the future.

Just as "UFOs: The Best Evidence (Ever Caught On Tape)" was spiced with the barest hints of skepticism, "Prophecies of the Millennium" was sprinkled with weasel words or carefully crafted phrases designed to give the illusion of objectivity.

While Kiviat's UFO program hinted at a government UFO coverup, even as it was spinning the "evidence" in a way that would make any government propagandist proud, "Prophecies" had the audacity to spend part of the program lamenting the threat of apocalyptic cults while at the same time promoting the idea that the end of the world is at hand. An estimated 6.8 million Americans watched the show.

Fox introduced each of the programs with a disclaimer warning that the show "is based on speculation and conjecture. Viewers should explore all sources of information before reaching their own conclusion."

That doesn't excuse the network. First, viewers who tuned in after the first thirty seconds of the program missed the disclaimer; it should have been repeated throughout each show. Second, the fact that Fox felt the need for a disclaimer in the first place suggests that the network knew these shows were not responsible representations of reality.

That makes the decision to air them all the more egregious. An institution that truly cares about its viewers, faced with a "documentary" that misses or distorts half the story, has an obligation to refuse to run it, provide rebuttal time, or order the producer to make changes that make the show honest.

With its sly disclaimer, Fox assumed the role of the crafty carnival barker, whose willingness to hawk his fabricated attractions demonstrates an underlying contempt for his audience.

Topping it off was a Fox miniseries, "Beyond Belief: Fact or Fiction?" which invited viewers to guess whether five minidramas presented in each hour-long program were true or the product of a writer's imagination. (The August 15 episode drew 8.1 million viewers.)

This sounds like a useful exercise for television viewers in an era when TV has blurred the line between fact and fantasy. Unfortunately, "Beyond Belief" smudged the line to the point of invisibility.

For example, the story of a child who gets psychic messages from an imaginary friend and the tale of a spirit that repeatedly desecrated the insides of her locked mausoleum until the body of her abusive mother was moved out of the tomb were declared "true" with no supporting evidence. Potentially plausible tales, such as the courtroom drama about an accused murderer who freaks out when he believes he can see his victim in the courtroom (when nobody else can), were declared fiction.

Fox has apparently adopted the supermarket tabloids' curious definition of truth, where an outrageous story is regarded as "true" if the storyteller's tale is reported accurately. Whether the event really happened is irrelevant.

It's another reflection of how truth, once a revered and sought-after commodity, has become a relative concept. □

The Mars Effect in Retrospect

The so-called Mars effect has haunted science for forty years now, but there's a light at the end of the tunnel. It most likely has been an illusion after all.

JAN WILLEM NIENHUYS

The Mars effect hypothesis was first published by the French psychologist Michel Gauquelin in 1955. It says that Mars occupies certain positions in the sky more often at the births of sports champions than at the births of ordinary people. More precisely, the celestial path along which Mars travels from rising to setting is divided into six equal parts, called *sectors*. Sector 1 starts where Mars rises; sector 4 starts when Mars crosses the north-south meridian (the mid-heaven); and sector 6 ends with Mars setting on the horizon. The *key sectors* for sports champions are sectors 1 and 4. The time that Mars is below the horizon is similarly divided into sectors 7 through 12. Gauquelin claimed that among outstanding sports champions the *Mars rate*—percentage born in key sectors—was not around the base Mars rate of the population at large, namely 17 percent, but rather more like 22 percent.

Gauquelin had more such hypotheses. They all involved

sectors 1 and 4 and various combinations of planets and professions. If these findings could be reliably reproduced, then they might herald a major overhaul of science, even though they were devoid of any practical importance whatsoever. These planetary hypotheses are unrelated to the very real phenomenon that the birth dates of proficient sports people tend to be distributed very nonuniformly across the seasons (Dudink 1994). Indeed, the rise of Mars can occur any time of the day, independent of season.

German astrologer Peter Niehenke (1994) has called these alleged planetary effects invaluable scientific facts; quoting the German psychologist Suitbert Ertel, who has stated that Gauquelin's findings are just like any other empirico-theoretical scientific structure that has been proved true in history. The British psychologist Hans Jürgen Eysenck thinks that Gauquelin's results are the only reason not to reject astrology completely (Gauquelin 1988). Astrologer Robert Hand has stated that Gauquelin's findings are "one of the strongest threats to mechanist-materialism in existence" (Mann 1987); and A. Mather is on record with, "It is probably not putting it too strongly to say that everything hangs on it" (Mather 1979).

Gauquelin's hypothesis has been tested several times. The first such test was undertaken by the Belgian Para Committee (Comité Para) in 1967. They let astrologer Luc de Marré collect birth data (dates, places, times) of 62 Belgian soccer players, and Gauquelin collected data of 473 French champions, many of whom were already known to Gauquelin and even published by him in 1955. In 1976 the final result was announced. Out of the 535 champions, 119 (22.24 percent) were born in a key sector. The Para Committee, however, was not convinced. They considered the result to be merely a rejection of Gauquelin's method for computing the base rate, which they thought invalid.

To get the exact base rate for the population at large is not so simple. One might naively think that two sectors out of twelve make for a 16.67 percent base rate, but there are various small effects that raise this number somewhat. In the columns of *Leonardo* and *The Humanist,* a lively discussion on astrology in general and this subject in particular had been going on since 1973. In 1976, after the publication of the Para Committe test results, statistician Marvin Zelen proposed in *The Humanist* a test to settle this matter (Zelen 1976). The test involved collecting data about a huge number of "ordinary people." The Gauquelins (Michel and his wife Françoise) agreed to perform the proposed test under controlled conditions.

The results of the "Zelen test," as it is known, were published by the Gauquelins in *The Humanist* in late 1977 (Gauquelin and Gauquelin 1977). They showed that the base rate for the general population was close to 17 percent after all. This meant that the Mars effect was either genuine or due to data-handling errors. In their adjoining commentary on the Zelen test results, Zelen, Paul Kurtz, and George Abell pointed out possible compromises to the representativeness of the sports champion sample used by the Gauquelins as a result of their deviating from the test protocol (Zelen et al. 1977). Hence a completely new test with entirely fresh data was called for. This new test was the famous U.S. test of the Mars effect for American sports champions, the results of which were published in the SKEPTICAL INQUIRER (Kurtz et al. 1979–80). The bottom line was that out of 408 champions only 55 (13.48 percent) were born in a Mars key sector.

This test generated a lot of discussions, and discussions about discussions, almost *ad infinitum,* and certainly *ad nauseam.* In the process, Zelen et al.'s mildly critical comment on the results of the Zelen test was transmogrified into an urban legend about a major coverup by dastardly CSICOP. (Zelen was a fellow of the newly founded Committee for the Scientific Investigation of Claims of the Paranormal, along with Kurtz and Abell.) A story by Michel Rouzé on the U.S. test in the French science magazine *Science & Vie* in March 1981 drew a response from Michel Gauquelin, which finally led in 1982 to the publication of a research protocol for yet another test to be performed, this time by the French skeptical committee CFEPP (Comité Français pour l'Etude des Phénomènes Paranormaux).

The French skeptics eventually found that out of 1,120 champions, 209 (18.66 percent) were born in a key sector (Benski et al. 1996).[1] The protocol had stipulated that the base rate be determined in the manner proposed by the Zelen test,[2] requiring the collection of an enormous amount of data. However, the CFEPP was exhausted and could not collect any more data, let alone many thousands of birth times (24,000 from Paris alone!), to serve as a comparison. After consultation with Michel Gauquelin, another method was proposed, namely, random coupling of years, dates, places, and times to generate a set of artificial records. This method had already been considered by the Para Committee in 1970. It yields 17.70 percent as base rate. The difference between 17.70 and 18.66 percent is trivial. It should be emphasized that the French test covered a population that had been investigated three times before by Gauquelin and the Para Committee, in 1955, 1967, and 1979.

The value of the CFEPP test is its protocol. The test determined what remains of the Mars effect when one starts entirely from scratch, without the direct involvement of Gauquelin, and the answer is: nothing.

Such tests have an enormous error potential. The sports dictionaries from which the champions' names are taken contain errors, and selection errors can be avoided only by having two dedicated workers or teams do the whole job independently in duplicate. Before a champion's name ends up with his or her Mars position in the final database, many more errors are made. At least, that has been my experience while checking all details of the CFEPP investigation. Even after the book was published, I found some errors. The most intractable error was CFEPP's miscalculation of the base rate (they had 18.20 percent instead of 17.70 percent). A suboptimal place-

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ment of a single instruction in their backup randomization program had slowed the speed of convergence.

Gauquelin Bias

The CFEPP protocol called for consultation with Gauquelin in all stages of the research (thus allowing him an indirect advisory role). So the CFEPP's lack of internal checks shouldn't have been a serious matter. But here something went wrong as well. Because of communication problems within the CFEPP, Gauquelin was informed only after all data had been gathered. However, he was then (in 1990) given ample opportunity to comment on their data.

Regrettably, Gauquelin's proposals to amend the CFEPP's database revealed a severe selection bias on his part. I did a comparison of Gauquelin's database (his published data as well as copies of his files as collected by Suitbert Ertel) and the CFEPP's data. There were 132 discrepancies between the two databases. By "discrepancy" I mean that either the date or time of birth for a champion was different. For each of these 132 cases, I also compared the Mars sector calculated for the champion by Gauquelin and by the CFEPP.[3] Some of the discrepancies, of course, resulted in different Mars sector computations; others did not. I divided the 132 discrepancy cases into: 1) those born in a key sector according to Gauquelin but not born in a key sector according to CFEPP; 2) those born in a key sector according to CFEPP but not born in a key sector according to Gauquelin; 3) and those that I call "indifferent" —for example, cases where the discrepancy in date or time of birth did not result in different Mars sector computations; or those where the discrepancy in date or time of birth did result in different Mars sectors, but neither sector was a *key* sector (e.g., 2 and 11). Finally, I checked which data discrepancies Gauquelin reported to the CFEPP and which he did not. (It is important to note that Gauquelin saw only the CFEPP's *raw* data, i.e., the data showed no Mars sectors.) All of this is summarized in Table 1.

Of the 132 discrepancies, Gauquelin reported only 39 to the CFEPP. Twenty champions were born in a key sector according to Gauquelin but not according to the CFEPP data. Gauquelin reported all 20 of these discrepancies, recommending that the CFEPP data be changed. However, in the reverse situation—17 champions were born in key sectors according to the CFEPP data but not according to Gauquelin—Gauquelin did not report the discrepancies. It seems an unavoidable conclusion that Gauquelin had been computing Mars positions from the raw CFEPP data, and that he based his decisions on what to report and what not to report on the results of these computations.

Furthermore, the CFEPP had extracted 1,439 names from two sports dictionaries, but for 368 names they drew a blank at the town halls. In his comments on CFEPP data, Gauquelin said that he could provide the CFEPP with complete records in 79 cases. But again, the same pattern prevailed: of the 368 names, Gauquelin actually had records for 173 in his files. Of these, 39 were listed as key-sector champions, and Gauquelin reported 37 of these to the CFEPP. Of the 134 non-key-sector champions, Gauquelin reported only 42.[4]

Table 1. Evidence of Bias in Gauquelin's Comments on CFEPP Data

132 champions whose birth data differed in Gauquelin and CFEPP databases	Reported	Not Reported
Born in key sector according to Gauquelin; not born in key sector according to CFEPP	20	0
Not born in key sector according to Gauquelin; born in key sector according to CFEPP	0	17
"Indifferent"	19	76
Total	39	93

Note. "Reported" means that Gauquelin reported the discrepancy in the data and recommended the CFEPP data be changed. "Not Reported" means Gauquelin did not mention the discrepancy at all.

Basically, the CFEPP selected everybody who had been at least an individual national champion or recordholder, or who had been selected to represent France in an international contest. In some cases the CFEPP erred, sometimes overlooking qualified champions and other times selecting individuals that did not qualify according to the test criteria. Again the same pattern appeared. Gauquelin pointed out only "overlooked" champions that occurred in his own database (about half of all overlooked champions), and even then, generally only those born in key sectors, ignoring most of the ones not born in key sectors. For the "underqualified" champions selected by the CFEPP, the pattern was reversed again.

Supporters of Gauquelin have discussed the CFEPP investigation. Of course they thought the CFEPP was wrong, biased, and so on. At the same time they downplayed this evidence of Gauquelin's bias by omitting most details. Apparently they think the facts are too damning.

Dubious Cases

Some of Gauquelin's remarks about the CFEPP data were difficult to evaluate because he doubted the data for a rather inhomogeneous group of champions. In some cases Gauquelin surmised a confusion of identities, and in others the birth towns seemed incorrect to him. He questioned the birth dates of several champions because they differed from the dictionary dates, even though in some cases Gauquelin's unpublished data agreed with those found by the CFEPP. This group was small (only 17 names), but 9 did not occur in Gauquelin's files at all. This is remarkable because almost all other remarks by Gauquelin concerned champions that were in his files.

The reasons for doubt were mostly that the dictionaries and the town halls gave different information, and in one case there was a conflict with another dictionary. Later investigations, which I won't discuss in detail, have suggested that the Mars effect correlation was stronger among champions listed in several sports dictionaries. So when Suitbert Ertel recently attacked the U.S. test by comparing it to the Para Committee test,[5] I decided to get to the bottom of this. In any such

research an investigator may decide, at the merest hint that data may not be reliable, to discard the data. So, in the language of statistical testing, I framed a null hypothesis, namely, that Gauquelin would never throw away data of champions collected by himself once he had computed their Mars positions. I tested this hypothesis by looking at data collected by Gauquelin that might contain many dubious data points.

More specifically, I examined sports champions whose data (as shown by the sports books used[6]) were either highly ambiguous or wrong or both, namely:

(1) champions whose month of birth differed from that stated by the reference book, including cases where the book didn't give the month;

(2) champions whose place of birth differed from that stated by the book, including cases where that place was missing or uninterpretable, for instance because of a misprint;

(3) champions whose place of birth was stated to be Paris with no further indication of *arrondissement*, and where there wasn't a reliable research method for determining the Paris *arrondissement*.

(4) champions with a place of birth with a name that is so common that it is shared with at least ten other towns. This happens only with French champions and some place names that lack an indication of *département*.

Henceforth, champions that satisfy any of the above four conditions will be called "difficult to find." Any Mars effect investigation will end up with a number of such champions, and each investigator must decide how to handle such data.

The CFEPP investigation had shown that providing a town hall with wrong birth dates will often produce an answer such as: "Sorry. We can't find this person at the given date." If the town hall can find the requested person in its records, it will often correct the birth date and thus provide the researcher with reasons for doubt. Writing to the wrong place will understandably often produce negative results, but then, if different sources give different information, any positive answer may produce doubt because at least one source is contradicted.

Three Groups Collected by Gauquelin

That information on Paris champions is hard to find may become clear from Gauquelin's own publications. For example, France contains about 18 percent Parisians, much more than the 4 percent Parisians among Gauquelin's French champions. The sports facilities in a big city like Paris are much better than those in small towns or the countryside, so one might expect Paris to have a higher proportion of champions than the rest of France. The CFEPP had more than 15 percent Parisians in their initial sample. Incidentally, it had been remarked already in 1977 that the Mars rate among Gauquelin's Parisian champions was rather high, namely 33 percent.

Professor J. Dommanget has kindly provided me with a copy of the book used by Gauquelin to select champions[7] for the Para Committee test of 1967. This book, the *Dictionnaire des Sports* published by Seghers (Seidler and Parienté 1963), contains 636 eligible French champions; and judging from marginal handwritten annotations, Gauquelin requested birth data for 589, the remainder having no identifiable birth place. Useful data were obtained in 430 cases, and among these the number of those "difficult to find" was 88. Of these 88, 27 (30.7 percent) were born in a Mars key sector. (See Table 2.)

In 1979 Gauquelin published a new selection of European champions, taken from the successor of the Seghers dictionary, namely *Dictionnaire Encyclopédique des Sports, des Sportifs et des Performances*, by Bernard Le Roy (1973). Gauquelin considered all non-French champions mentioned in this work as eligible per se. Here the Mars rate among the "difficult to find" was high too.

From this same source Gauquelin selected 224 French champions. He used rather dubious criteria. For example, people engaged in "individual sports" were admitted only if they had at least obtained a medal in a European competition, whereas for soccer players, being selected once to defend the glory of France sufficed; on the contrary, for non-soccer team sports such as rugby and handball, more than ten selections for the national team were required. And again, the "difficult to find" yielded a high Mars rate.

Maybe the "difficult to find" among the three groups were eventually found because they were very famous, but I don't think so. There are several ways to compare fame or quality of these groups with the larger groups from which they are taken. They do not differ from these parent groups.

Control Groups Collected by CFEPP

For comparison we may look at the "difficult to find" in the CFEPP investigation. Some criteria do not apply here because CFEPP excluded all candidates with ambiguous birth places, and moreover they had a good research methodology for Paris. CFEPP volunteers spent a lot of effort searching systematically the twenty *arrondissements* of Paris. This yielded 127 champions, about three times the 44 that Gauquelin collected in

Table 2. "Difficult to find" Champions among Three Groups of Data Collected by Gauquelin

Group	Total champions found	No. "difficult to find"	No. of "difficult to find" born in key sector	% of "difficult to find" born in key sector
Seghers / Para Committee test (1967)	430	88	27	30.7%
Le Roy non-French European (1979)	134	37	13	35.1%
Le Roy French (1979)	224	40	11	27.5%
Total	788	165	51	30.9%

twenty-five years. Incidentally, there were a number of "Parisians" that CFEPP couldn't locate, probably because in many cases "Paris" may have meant a suburb of Paris.

Among the entire set of 1,120 CFEPP champions, 103 were "difficult to find" for the CFEPP in the technical sense defined; and of these, 15.5 percent were born in a Mars sector. That's hardly different from the base rate. It shows that "difficult to find" does not necessarily imply a high Mars rate. But among these 103, there were 20 that Gauquelin also must have tried to find, apparently in vain (if only while looking for the "lesser champions" that he used as control groups, without publishing their names and data). Of these 20, only one was born in a Mars sector.

There were other "difficult to find" champions in the CFEPP investigation that had not been found previously by Gauquelin. Among these were 33 champions (many from Paris) who were included in Gauquelin's search for the Para Committee test, but who were never found and also not found in later searches by Gauquelin. Among these 33, only 2 were born in a key Mars sector. As before, there's nothing especially "inferior" about these champions. Table 3 summarizes this information.

Table 3. Two Subsets of Champions Found by CFEPP and Absent from Gauquelin's Files

	No.	Born in key sector	Percent
"Difficult to find" for CFEPP; apparently searched for by Gauquelin	20	1	5.0%
Searched for by Gauquelin in Para Committee test; not found	33	2	6.1%
Total*	47	3	6.4%

*Note. The overlap of the two subsets is 6 champions; hence the total number of champions is 47, not 53.

The remaining newly found CFEPP champions comprise 91 people, of whom 17 (18.7 percent) were born in a key sector. Of these 91, 60 hailed from Paris (not "difficult to find" in the CFEPP test). A partly overlapping set of 50 was only mentioned in *L'Athlége*, hence it is not clear to me whether Gauquelin ever tried to obtain their data, and in the 13 remaining cases the town halls answered the CFEPP's inquiries, at most indicating minor corrections of the CFEPP's data.

If we consider Gauquelin's "difficult to find" Seghers and Le Roy dictionary candidates (from Table 2) together with the champions (from Table 3) that the CFEPP found, but Gauquelin didn't find even though he tried, and that were probably "difficult to find" for him, we get the summary shown in Table 4.

The conclusion seems reasonable that this is not the result of a chance process. It must be left to the reader to judge whether this is merely a product of dexterous data juggling by this author, or that 30.9 percent and 6.4 percent really differ. Readers who are fond of *post hoc* significance calculations might try Fisher's exact test.[8]

I believe Table 4 indicates a bias on Gauquelin's part. There's nothing wrong with throwing away unreliable data,

Table 4. Evidence of Gauquelin Throw-Away Bias

	Not born in key sector	Born in key sector	Total "difficult to find"	Mars rate for "difficult to find"
"Difficult to find" for Gauquelin; found	114	51	165	30.9%
Probably "difficult to find" for Gauquelin; not found	44	3	47	6.4%

but you shouldn't look at the Mars sector data first and then make up your mind. This is apparently what Gauquelin did. Most of the champions in Table 3 are champions that the CFEPP, in a manner of speaking, fished out of Gauquelin's wastepaper basket.

I conjecture that Gauquelin systematically threw away "unreliable" data of champions who weren't born in a key sector. In some cases he might have kept the data without publishing them, until he could obtain more certainty. Another point of support for my conjecture is the composition of the champions who weren't found by the CFEPP, but whose names had been found and published by Gauquelin before. There were 98 of these, and about two-thirds, 63, were "difficult to find." Among these there are 20 (31.7 percent) born in a Mars sector. Of course there are many of these among the Seghers champions and the French Le Roy champions mentioned above, but about half them are not.

Ertel's Views

Ertel (1988) observed already that Gauquelin's judgment about champion quality was biased, but he tried to save the Mars effect. He said that the Mars effect was stronger among champions who were mentioned in many different sports dictionaries. I think the explanation is that Gauquelin's doubts were stronger if a champion occurred in more than one source he knew, and if these sources contradicted each other.

The total of 1,439 eligible champions of the CFEPP can be divided into six groups:

(a) found and published by Gauquelin but not found by CFEPP;
(b) found and published by Gauquelin and found by CFEPP;
(c) not found by Gauquelin and found by CFEPP;
(d) found but not published by Gauquelin and found by CFEPP;
(e) found but not published by Gauquelin and not found by CFEPP;
(f) not found, neither by Gauquelin nor by CFEPP.

From (a) to (e) the Mars rate goes down, which makes sense if one assumes that Gauquelin was holding back or throwing away "dubious" data. The Mars rate of (f) cannot be determined, but something can be said about it. Gauquelin mentioned 73 champions in this group but didn't mention 39 that he almost certainly must have tried to find. What was he holding back?

Ertel and Irving (1996) attack the CFEPP study on the same grounds. Ertel assumes that Gauquelin is free from any bias, but that the CFEPP was biased, for example by avoiding to choose famous champions or including droves of mediocre athletes—as if the CFEPP secretly believed Ertel's theory.

I don't think this is correct. First, there's the evidence that Gauquelin was biased in several respects. Second, Ertel doesn't mention group (e). By his count (generally his counts are erroneous) group (e) should contain 36 champions, with a Mars percentage of only 8 percent. How could a CFEPP bias bring that about? Third, I have looked at all French champions in Gauquelin's database whose names occurred in at least two sports dictionaries different from Le Roy. Altogether there were only 41 that were not selected by the CFEPP, generally for good reasons (such as unqualified, birth place missing, or not at all mentioned in the CFEPP's sources, or born outside of France). *Only 3 of them were born in a Mars key sector.* So where are those famous champions that the CFEPP deviously excluded to suppress the Mars rate? Ertel has pointed out that the CFEPP refused to include Algerians. Ertel only looks at the Algerians in Gauquelin's database (17 qualified, with a Mars rate of 41 percent), and he ignores that the CFEPP's sources contain twice as many, namely 34. Why would a CFEPP search turn up precisely Gauquelin's Algerians? Fourth, the CFEPP's standards couldn't be much higher, as the protocol specified a minimum of a thousand champions.

Fifth, Ertel claims that group (c) consists of "athletes for whom Gauquelin had never requested data," and he displays prominently the low Mars rate (as computed by him) of this group. As we have seen, it is simply not true that Gauquelin never requested these data. And if a Gauquelin bias is the explanation for the low Mars rate shown in Table 3, then there is no low Mars rate left to explain for the remaining 91 members of this group.

The Mars effect hypothesis was based on data collected by Gauquelin. The evidence for Gauquelin's massive bias is compelling. No value can be attached to the hypotheses these data gave rise to. This does not imply any willful deceit on the part of Gauquelin. The eminent physicist René Blondlot never gave up believing in his nonexistent N-rays and died twenty-seven years after his "discovery." The academician Boris Deryagin acknowledged after ten years he was mistaken about polywater. Two-time Nobel laureate Linus Pauling never gave up his belief in vitamin C, even though clear clinical evidence never materialized. Even the best scientists can be trapped in illusions of their own making. Michel Gauquelin died in 1991. His archive is gone, and no one knows what he would have said upon confrontation with his bias. Let's leave it at that and move on to more fruitful research.

Acknowledgments and Final Remarks

I would like to thank Françoise Schneider-Gauquelin for generously and promptly providing me with Gauquelin's publications containing names of European sports champions, and Carl Koppeschaar for making Gauquelin's database (as collected by Ertel) available to me, as well as for many other things. I also would like to thank Gwen A. Burda, J. Dommanget, Cornelis de Jager, Ivan Kelly, Jean Meeus, Lewis Jones, Paul Kurtz, Ranjit Sandhu, and Edgar Wunder for various contributions and comments.

This article is a condensed and amended version of a paper presented at the World Skeptic's Conference, June 20–23, 1996, in Amherst, New York. The full paper and all data underlying it can be obtained from the author.

Notes

1. The numbers given in this paragraph differ from the ones in Benski et al. 1996, because only after the appearance of that book could I muster the time and energy to write (from scratch, but with the help of the excellent book by Jean Meeus [1991]) a program to compute the rise and set of Mars with two-second precision.

2. The Zelen test was based on weighing the control population, giving all births corresponding to a single champion birth date a fixed joint weight. For the CFEPP test, all control births should have received equal weights, so the Paris controls would have constituted a large part of all controls.

3. Gauquelin had Mars sectors computed in his files. The data made available to me by the CFEPP showed their Mars sector computations (when Gauquelin saw the CFEPP data, it did not show Mars sectors).

4. From copies of Gauquelin's files collected by Suitbert Ertel.

5. Ertel and Irving (1997), followed by a rejoinder by Kurtz et al. (1997). Small errors in the latter, notably in what is here Table 3, have been corrected.

6. I investigated the Seghers dictionary (Seidler and Parienté 1963), used in the 1967 Para Committee test; the Le Roy dictionary (Le Roy 1973), used by Gauquelin in 1979 and by the CFEPP; and *L'Athlége* (1951), used by the CFEPP.

7. For French champions another source was also used, namely lists published by France Football of national soccer team players up until 1962. These lists ultimately yielded 43 names with birth dates and birth times.

8. Significance calculations are a kind of scientific bet. They only make sense if they are planned ahead of data collection. In ordinary life, betting after the race is over, or placing several bets for the price of one, isn't considered fair, and in this respect science ought to be like ordinary life.

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Hidden Messages and the Bible Code

"Hidden messages" can be found anywhere, provided the seeker is willing and able to harvest the immense field of possibilities. But do they mean anything?

DAVID E. THOMAS

Bible Code: The Book

A new book entitled *The Bible Code* (Drosnin 1997) came out last June and has occupied the bestseller lists since then. It is written by journalist Michael Drosnin, who claims that the Hebrew Bible contains a very complex code that reveals events that took place thousands of years after the Bible was written. Drosnin contends that some foretold events later happened exactly as predicted.

The book has been reviewed widely and has stimulated pieces in *Newsweek* and *Time*. Drosnin has also been making the rounds of the talk-show circuit, including the *Oprah Winfrey Show* in June. *Time* said that Warner has reportedly bought the movie rights (Van Biema 1997).

Drosnin's technique is heavily based on that of Eliyahu Rips of Hebrew University in Israel, who published an article entitled "Equidistant Letter Sequences in the Book of

Genesis" in the journal *Statistical Science* (Witztum, Rips, and Rosenburg 1994). Like Rips, Drosnin arranges the 304,805 Hebrew letters of the Bible into a large array. Spaces and punctuation marks are omitted, and words are run together one after another. A computer looks for matches to selected names or words by stepping to every *n*th letter in the array. One can go forward or backward; and for each value of "step distance," *n*, there are *n* different starting letters. Drosnin's match for "Yitzhak Rabin" had a step value *n* equal to 4,772.

Both Rips and Drosnin work with the original Hebrew characters, which are said to have been given by God to Moses one character at a time, with no spaces or punctuation, just as they appear in "the code." The code is considered to exist only in the Hebrew Bible and not in translations or any other books. The code concept, however, can be easily demonstrated with English characters. Consider the following verse from the *King James Version (KJV) of the Book of Genesis:*

31:28 And hast not suffered me to kiss my sons and my daughters? thou hast now done foolishly in so doing.

If you start at the R in "daughters," and skip over three letters to the O in "thou," and three more to the S in "hast," and so on, the hidden message "Roswell" is revealed! This message has a step value of 4, as shown in Figure 1.

G H T E R S T H O U H A S T N O W D O N E F O O L I S H L Y I N S

Figure 1. "Roswell" hidden in KJV Genesis 31:28.

When Drosnin finds a name or word match for a given step value *n*, he then rearranges the letters into a huge matrix (which he calls a "crossword puzzle"). The matrix is *n* letters wide, and inside this puzzle, the letters for the "hidden message" line up together vertically. (Sometimes, a slightly different procedure is used to make the hidden word run diagonally, every other row, and so forth.) The analyst or the computer can then look for more keyword-related "hits" around the given hidden word. Secondary matches can be picked off vertically, horizontally, or diagonally. Drosnin found the word "Dallas" (connected with keywords "President Kennedy") in one of his puzzles by starting at a D, and then picking the next letters by moving one space over to the right and three spaces down several times.

An example of such a matrix for the "Roswell" mention in KJV Genesis appears in Figure 2. The letters of "Roswell" now appear vertically at the center of the puzzle. The actual matrix of unique letters is only four characters wide here (dashed box), but I took the liberty of showing extra letters for context. A companion hidden message—"UFO"—is indicated within circle symbols. This "UFO" is itself a hidden message with a step value of 12. Drosnin accepts any such messages, even words running *horizontally* (i.e., the actual words of the Bible strung together). If either "Roswell" or "UFO" had been found encoded in the Hebrew Bible, Drosnin would not have hesitated to use words from the direct text as a "match" (for example, the words "thou hast now done foolishly.")

The unusual pairing of "Roswell" and "UFO" is shown in

S A N D M Y D A U G H T E R S T H O U H
M Y D A U G H T E R S T H O U H A S T N
U G H T E R S T H O U H A S T N O W D O
E R S T H O U H A S T N O W D O N E F O
H O U H A S T N O W D O N E F O O L I S
A S T N O W D O N E F O O L I S H L Y I
O W D O N E F O O L I S H L Y I N S O D
N E F O O L I S H L Y I N S O D O I N G
O L I S H L Y I N S O D O I N G I T I S
H L Y I N S O D O I N G I T I S I N T H

Figure 2. Matrix or "crossword puzzle" for "Roswell/UFO" hidden in KJV Genesis.

T E R S T H O U H A S T N O W D O N E F O O L I S H L Y I N S O D O

Figure 3. "Roswell" and "UFO" hidden in KJV Genesis 31:28.

linear form in Figure 3. This match is as stunning as any described in Drosnin's book—yet none claim that the Bible code would have translated gracefully over to the KJV Genesis.

Drosnin claims mathematical proof that "no human could have encoded the Bible in this way" (Drosnin 1997, 50–51). He says, "I do not know if it is God," but adds that the code proves "we are not alone."

Hidden Messages

Some believe that these "messages" in the Hebrew Bible are not just coincidence—they were put there deliberately by God. But if someone finds a hidden message in a book, a song played backwards, funny-looking Martian mesas, or some other object or thing, does that prove someone *else* put the message there *intentionally?* Or might the message exist only in the eyes of the beholder (and in those of his or her followers)? Does perception of meaning prove the message was deliberately created?

Most of the data cited in favor of the purported intelligent alien construction of the "Face on Mars" is based on mathematical relationships among various Martian structures and locations. For example, author Richard Hoagland finds the "Cydonian" ratio (the "face" lies on the Cydonia plains region of Mars), e/π, in the tangent of the face's latitude of 40.868 degrees north, in the ratios of angles of the D&M Pyramid, and in numerous other places (Hoagland 1992). Does that mean the "face" and "city" on Mars were "designed" for the express purpose of spreading that very message? Hoagland emphatically says, "Yes!" My inner skeptic says, "Not so fast!"

In my research into such phenomena, I have found numer-

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ous instances of Hoagland's Martian ratios on objects we know were not designed or built by aliens, such as the U.S. Capitol rotunda (Figure 4). Does that prove that Martians built this structure? Or is this phenomenon related mainly to the determination and skill of the person looking for a special message? *Any* special message?

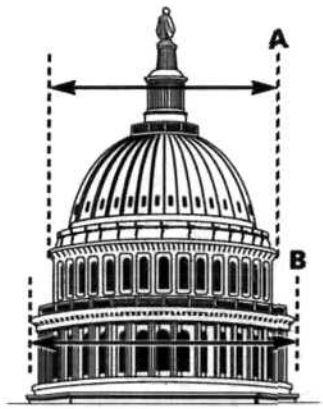

Figure 4. The "Martian" ratio e/π ≈ A/B, hidden in the Capitol rotunda (precise measurements of A and B yield A/B = 0.863, while e/π = 2.71828/3.14159 = 0.865, an error of less than one half of one percent).

There are dozens of books about Nostradamus. In one (Hewitt and Lorie 1991), the authors find hidden predictions by scrambling the seer's quatrains (in French, no less), and then decoding according to an extremely complicated and mysterious formula. The back cover prominently displays one such unscrambled prediction: "1992—George Bush re-elected." (Wrong.) The authors should have known that it's much safer to find hidden predictions of events that have already happened.

Some critics of Drosnin say the journalist is just "data mining." Mathematician Brendan McKay of Australian National University and his colleagues searched Hebrew texts besides the Bible. They found fifty-nine words related to Chanukah in the Hebrew translation of *War and Peace*. But McKay doesn't think someone engineered this remarkable feat for his or anyone's benefit. Since then, McKay has responded to the following challenge Drosnin made in *Newsweek*: "When my critics find a message about the assassination of a prime minister encrypted in *Moby Dick*, I'll believe them" (Begley 1997). McKay found assassination "predictions" in *Moby Dick* for Indira Gandhi, Rene Moawad, Leon Trotsky, Rev. M. L. King, and Robert F. Kennedy (see http://cs.anu.edu.au/~bdm/dilugim/moby.html). Eliyahu Rips himself has denied Drosnin's implication that they worked together, and has said, "I do not support the book as it is or the conclusions it derives" (Van Biema 1997).

Hidden Names in KJV Genesis and *Edwards v. Aguillard*

I have very recently carried out a study on finding hidden names in both the KJV Genesis and the U.S. Supreme Court's 1987 ruling on *Edwards v. Aguillard* (a well-known ruling on creationism, hereafter referred to as simply *Edwards*). I used the same set of rules for both the KJV Genesis (about 150,000 characters) and *Edwards* (about 100,000 characters). I loaded a list of preselected names and let the computer search for each one in turn, for equidistant letter sequences with step distances from 2 to 1,000, and for every possible starting letter. I searched forward only.

One would expect that special biblical messages hidden in the Hebrew Bible would simply not make it into the King James Version, much less into *Edwards*. And since the Hebrew alphabet doesn't include vowels, it should be much harder to find matches in the English texts, because an additional character match is required for each vowel.

Drosnin's control was the Hebrew text of *War and Peace*. Drosnin claims that when they searched for words (such as "comet," "Jupiter," etc.) in the Bible, they often found them there, but *not* in *War and Peace*.

I picked a set of names carefully. The list contained five names of four letters, five of five letters, five of six letters, five of seven letters, and five of either eight or nine letters. I was more whimsical in my choice of subjects and chose talk show hosts, scientists, and just plain folks as well as political or historical figures. I found *thousands* of hidden occurrences of these names in both Genesis and *Edwards*. The results appear in Table 1.

It is striking that tens of thousands of hidden occurrences were found for the twenty-five names submitted, for both Genesis and *Edwards*. More matches were found in the former, but it does have 50,000 more letters to work with. Another important observation is immediately apparent in Table 1—short names like "Leno" or "Reed" were found much more fre-

Length	Name	Genesis	Edwards
4 Letters	Deer	7440	3255
	Dole	2692	1349
	Leno	3353	2836
	Newt	2554	1026
	Reed	7340	3326
5 Letters	Gould	5	4
	Oprah	49	31
	Regis	51	71
	Rosie	202	341
	Sagan	107	62
6 Letters	Asimov	1	0
	Darwin	3	1
	Hitler	18	13
	Romero	6	1
	Stalin	15	10
7 Letters	Clinton	0	0
	Frazier	0	0
	Gardner	0	1
	Hillary	0	0
	Kennedy	0	0
8 or 9 Letters	Einstein	0	0
	Gingrich	0	0
	Churchill	0	0
	Letterman	0	0
	Matsumura	0	0
	Sum	23836	12327

Table 1. Counts of hidden words found in KJV Genesis and Edwards v. *Aguillard*, at steps of 1,000 or less, forward only.

quently than long names like "Gingrich" or "Matsumura." ("Matsumura" is, of course, Molleen Matsumura of the National Center for Science Education, in Berkeley, and "Romero" is Albuquerque boxer Danny Romero). "Martin Gardner" was found hidden in *Edwards,* much as Gardner anticipated could happen in his discussion of gematria and the work of Rips and his colleagues (Gardner 1997).

The results are clear and compelling, and certainly not surprising. It is much easier to find short names than long names. There might be thousands of occurrences of the four-letter name "Rich," for example. But matching "Gingrich" is much harder, since few or none of the thousands of instances of "Rich" will be preceded by "Ging" at exactly the right step locations. But there are 2,554 hidden occurrences of "Newt" in KJV Genesis, so one could *imagine* that the Speaker of the House is certainly mentioned copiously.

There is, of course, another factor in the success of hidden word searches. Simply put, some letters are more common than others. Figures 5a and 5b give the relative frequencies for the letters in Genesis and *Edwards.*

The charts show that certain letters (such as A, D, E, H, I, N, O, R, S, and T) appear more often than others. Obviously, words made with these "hot" letters (such as "Reed," "Deer," "Stalin," or "Hitler") have a better chance of being found than words containing any "cool" letters like J or Q. "Rosie" had 202 Genesis matches, more than the 49 for "Oprah"—but "Oprah" contains a cool P. (I also searched for "Harpo," which is just "Oprah" backwards, and found 62 hits).

When I performed a separate search for "Roswell" in KJV Genesis, I only found one hidden match for this seven-letter word. But I found 5,812 matches for "UFO," 187 for "disk," 5 for "MOGUL," 4,798 for "NYU," 2 for "weather," 1,552 for "gear," 77 for "crash," 4 for "dummy," 295 for "alien," and 2 for "saucer." I couldn't find "Roswell" in *Edwards* at steps of 1,000 or less, but I did find most of the others, and in similar numbers.

How Unusual Are Paired Messages?

Drosnin and others sometimes admit that finding isolated hidden names or messages can be the product of random chance. But they claim that finding *linked* pairs or triples of names or words is so improbable that doing so proves the supernatural, divine, or alien origin of the "message." In Drosnin's words,

> Consistently, the Bible code brings together interlocking words that reveal related information. With Bill Clinton, President. With the Moon landing, spaceship and Apollo 11. With Hitler, Nazi. With Kennedy, Dallas.
>
> In experiment after experiment, the crossword puzzles were found only in the Bible. Not in *War and Peace*, not in any other book, and not in ten million computer-generated test cases. (Drosnin 1997, 26)

Perhaps there was a bug in Drosnin's computer program. Or perhaps he didn't really want to find hidden message pairs outside of the Hebrew Bible. All I know is that I was able to easily produce complex hidden messages in all the texts I worked with.

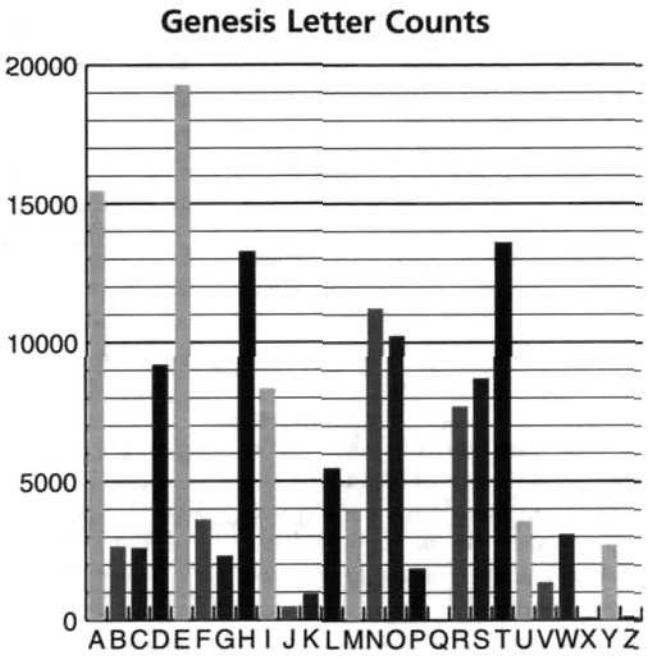

Figure 5a. Frequencies of letters of the alphabet in KJV Genesis.

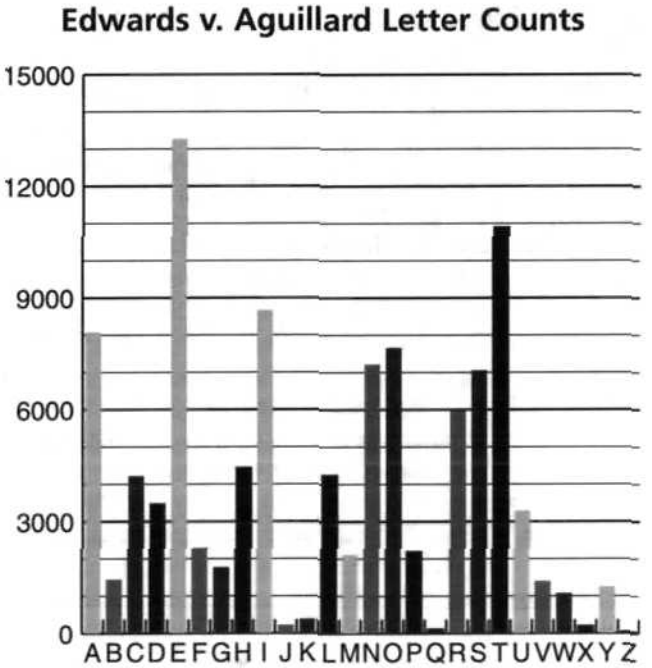

Figure 5b. Frequencies of letters of the alphabet in *Edwards v. Aguillard.*

I developed a computer program that takes various words already located as hidden codes (such as "Hitler" and "Nazi") and plays them against each other to find the best-linked pairs. The starting letters and equidistant steps provide all the necessary information, provided one learns how to manipulate it.

I then used this approach to develop the puzzles shown in Figure 6a (Genesis, step = 500) and Figure 6b (*Edwards,* step = 157), both with direct coded linkages of "Hitler" and "Nazi." These puzzles are striking counterexamples of

Drosnin's claims.

In response to Drosnin's challenge, I decided to look for "Hitler" and "Nazi" linked in Tolstoy's *War and Peace* as well. I found an English translation of the epic novel on the Internet, and downloaded the first twenty-four chapters of Book 1, giving me about 167,000 characters. By the time I got to steps of just 750, I already had found more than half a dozen excellent puzzle linkages of "Hitler" and "Nazi." The best appears in Figure 7: this entire puzzle text spans just five paragraphs of Chapter 2 of Book 1 of Tolstoy's novel.

Drosnin uses many methods to improve the odds of "impossible-by-chance" linkages. For one, he uses horizontal words taken directly from the original text. For example, when Drosnin found "Clinton" linked to "president," the word "president" was just the Hebrew word for "chief," taken from its actual context in the original Bible. Secondly, Drosnin found some hidden dates referring to the Hebrew calendar; for example, Gulf War activity on January 18, 1991, was found in the words "3rd Shevat." But, he found other dates referring to the Gregorian calendar, such as that of the Oklahoma City bombing, which was linked in the Bible by the hidden date "Day 19," and interpreted as a reference to both April 19, 1995, the date of the bombing, and April 19, 1993 (Waco). And finally, Drosnin takes full advantage of the eccentricities of the Hebrew language, in which words can be condensed and letters occasionally dropped.

My study generated several other examples that are just as spectacular, and just as unlikely (if not more so), than most of Drosnin's matches. Now, Drosnin and his colleagues would probably say that the "Roswell/UFO" connection in KJV Genesis was just a lucky break and couldn't happen again. But I found 5,812 hidden "UFO's" in Genesis, and dozens of these happen to be flying right around and *through* the hidden word "Roswell." As the puzzle step is changed, linked matches appear and disappear with astonishing frequency. Three such examples appear in Figure 8, for steps of 88, 589, and 753. Hoagland claims multiple discoveries of the same hidden message are indicative of "redundancy" used by the code-maker to assure us the message is real (Hoagland 1992). But all that is really happening here is that codes can be engineered—*made* to happen. You just have to know how to harvest the field of possibilities.

Figure 9 is another striking linkage I found in KJV Genesis, 42:18 through 45:21. Here, the name "Regis" appears at a step

```
COMEAFLOODTODESTROYALLFLESHANDTHEBOWSHALLBEINTHECLOUDANDIW
NANHEWASUNCOVEREDWITHINHISTENTANDHAMTHEFATHEROFCANAANSAWT
INTHETENTSOFSHEMANDCANAANSHALLBEHISSERVANTANDNOAHLIVEDAFTE
INTHEIRNATIONSANDTHESONSOFHAMCUSHANDMIZRAIMANDPHUTANDCANAA
UDIMANDANAMIMANDLEHABIMANDNAPHTUHIMANDPATHRUSIMANDCASLUHIM
IESANDINTHEIRNATIONSUNTOSHEMALSOTHEFATHEROFALLTHECHILDRENO
ONSOFJOKTANANDTHEIRDWELLINGWASFROMMESHAASTHOUGOESTUNTOSEPH
FORSTONEANDSLIMEHADTHEYFORMORTERANDTHEYSAIDGOTOLETUSBUILDU
UPONTHEFACEOFALLTHEEARTHANDTHEYLEFTOFFTOBUILDTHECITYTHEREF
LIVEDTHIRTYYEARSANDBEGATEBERANDSALAHLIVEDAFTERHEBEGATEBERF
DAFTERHEBEGATNAHORTWOHUNDREDYEARSANDBEGATSONSANDDAUGHTERSA
```

Figure 6a. Step matrix for Genesis, "Hitler/Nazi," step = 500.

```
UISIANADEPARTMENTOFEDUCATIONTHESCHOOLSUPERINTENDENTSIN
EDINTHESTATUTEABOUTPERCENTOFLOUISIANASSUPERINTENDENTSS
INTENDENTSINTERPRETEDCREATIONSCIENCEASDEFINEDBYTHEACTT
CHINGTHEVIEWTHATTHEUNIVERSEWASMADEBYACREATORIDATETHECO
GTHEINTENTOFTHELEGISLATURECONTEMPORANEOUSTOTHEPASSAGEO
THATFOUNDSTATESTATUTESTOBEUNCONSTITUTIONALHAVEBEENDISP
ONNORJOINSCONCURRINGIWRITESEPARATELYTONOTECERTAINASPEC
RETIONACCORDEDSTATEANDLOCALSCHOOLOFFICIALSINTHESELECTI
ERMINEWHETHERAPARTICULARSTATEACTIONVIOLATESTHEESTABLIS
INVOLVINGTHESENSITIVERELATIONSHIPBETWEENGOVERNMENTANDR
ARLEGISLATIVEPURPOSELEMONVKURTZMANSUPRAATSEECOMMITTEEF
THEESTABLISHMENTCLAUSEIATHESTARTINGPOINTINEVERYCASEINV
NCEDTREATMENTFORCREATIONSCIENCEANDEVOLUTIONSCIENCEACTA
TREATMENTTOCREATIONSCIENCEANDTOEVOLUTIONSCIENCEBALANCE
```

Figure 6b. Step matrix for *Edwards v. Aguillard*, "Hitler/Nazi," step = 157.

```
WITHQUICKSHORTSWAYINGSTEPSHE
ESSSATDOWNONASOFANEARTHESILV
HERSELFANDTOALLAROUNDHERIHAV
RBAGANDADDRESSINGALLPRESENTM
CKONMESHEADDEDTURNINGTOHERHO
PTIONANDJUSTSEEHOWBADLYIAMDR
WAISTEDLACETRIMMEDDAINTYGRAY
REASTSOYEZTRANQUILLELISEYOUW
NNAPAVLOVNAYOUKNOWSAIDTHEPRI
TURNINGTOAGENERALMYHUSBANDIS
LMEWHATTHISWRETCHEDWARISFORS
ITINGFORANANSWERSHETURNEDTOS
ELIGHTFULWOMANTHISLITTLEPRIN
THENEXTARRIVALSWASASTOUTHEAV
ACLESTHELIGHTCOLOREDBREECHES
ROWNDRESSCOATTHISSTOUTYOUNGM
LKNOWNGRANDEEOFCATHERINESTIM
```

Figure 7. *War and Peace*, "Hitler/Nazi," puzzle step = 69, "Hitler" step = 3, "Nazi" step = 207.

```
THEEAWAYWITHMIRTHANDWITHSONGSWIT
AUGHTERSTHOUHASTNOWDONEFOOLISHLY
RFATHERSPAKEUNTOMEYESTERNIGHTSAY
NOWTHOUGHTHOUWOULDESTNEEDSBEGONE
ASTTHOUSTOLENMYGODSANDJACOBANSWE
```

Figure 8a. Step matrix for Genesis, "Roswell/UFO," step = 88.

```
ALLTHERICHESWHICHGODHATHTAKENFRO
RETHRENWITHHIMANDPURSUEDAFTERHIM
ERSTHOUHASTNOWDONEFOOLISHLYINSOD
ERVANTSTENTSBUTHEFOUNDTHEMNOTTHE
ENTYYEARSHAVEIBEENWITHTHEETHYEWE
```

Figure 8b. Step matrix for Genesis, "Roswell/UFO/UFO," step = 589.

```
KANDSAIDUNTOTHEMISEEYOURFATHER
LTHATLABANDOETHUNTOTHEEIAMTHEG
OLDHIMNOTTHATHEFLEDSOHEFLEDWIT
GHTERSTHOUHASTNOWDONEFOOLISHLY
HEDALLTHETENTBUTFOUNDTHEMNOTAN
```

Figure 8c. Step Matrix for Genesis, "Roswell/UFO/IFO," step = 753.

```
USALITTLEFOODANDJUDAHSPAK
EREDSURELYNOWWEHADRETURNE
NDTHEMENWEREAFRAIDBECAUSE
RANDTHEYMADEREADYTHEPRESE
EEGYPTIANSMIGHTNOTEATBREA
BYINDEEDHEDIVINETHYEHAVED
ROUNDANDJOSEPHSAIDUNTOTHE
ESAIDUNTOMYLORDTHELADCANN
ANTSSHALLBRINGDOWNTHEGRAY
```

Figure 9. Step matrix for Genesis, first "Regis" at step = 808, second "Regis" at step = 810 (puzzle step = 809).

distance of 808, but also at a step of 810, which makes a nice "X" pattern if the puzzle step is 809. (Perhaps someone should notify Regis Philbin and agents Mulder and Scully).

If you work at any given puzzle for a while, large numbers of unexpected names and words invariably turn up. Consider the puzzle of Figure 10. This text is a *contiguous* rendition of Genesis 41:38–46. This particular puzzle is easy for the reader to verify manually, since it has a relatively small step of 40. The puzzle itself is 41 characters wide, so the rightmost column is a repetition of the leftmost. I used the computer to find several diagonal messages here: "Deer," "Regis," "Nazi," "Leno," "Dole." Many vertical messages were simple enough to be found just by poring over the puzzle: for example, "Oprah," "here," "Leia," "Hale," "sent," "nude," "pure," "hate," "data," "Roe," "Reed," "Meg," "hood," "pins (snip)," "Deion," and "lone." "Newt" is in there too, but at an offbeat step that makes for a jilted arrangement. And then, there are all those horizontal words too!

I suspect that with diligence, one could find enough matches to make almost all of the characters in the puzzle parts of hidden words. The puzzle below is literally dripping with additional hidden surprises. Rips himself appears in "spirit" read backwards. "Pour," "Alan," and "sash" run vertically. And diagonal messages of varying complexity lurk everywhere. Can you find the "apes" swinging between "data" and "Reed"? "Love" intersecting with "nude"? How about "Ares," "reel," "deft," "lion," "dogs," "pony," "hard," "diet," "trace," "card," "Poe," and "wart"? They are all in there—and more.

There are dozens of linked messages in the puzzle above. But how are we to know which words are linked by the secretive author? Is the "real" message "Nazi sent pure hate here," or is it "Deion pins nude Oprah?" All of these hits are authentic, encoded names that have lurked inside the text of the King James Version of Genesis for hundreds of years. But the whimsical combinations they appear in show that these surprises are simply lucky breaks, and not authentic messages from above.

What Are the Odds, Really?

Drosnin and his colleagues say that getting linked matches by coincidence is statistically impossible and cite the odds against such coincidences as more than 3,000 to 1 (and sometimes *much* more). Using numbers like these, the Bible code promoters try to convince their readers that the existence of God is now proven statistically *beyond the shadow of a doubt,* simply because they can find linked pairs like "Clinton" and "chief" in the same general area of the Bible.

But their core conclusions are based on severely flawed probability arguments. Drosnin's formulation of the improbability of the occurrence of linked pairs is implicitly based on the assumption that you have only one opportunity to get the match. But, with the help of the computer, Drosnin gets to take advantage of *billions* of opportunities.

Let's look at Drosnin's approach with a lottery analogy. The probability of winning a lottery with a single ticket is very small, and Drosnin says the probability of getting an improbable match (such as "Clinton" and "president") is also very small. But what happens if you buy more than one ticket?

In the New Mexico "Daily Millions" lottery, the odds of winning the $1 million jackpot with just one ticket are about ten million to one against. With two tickets, the odds plummet, to about five million to one. If you buy one million tickets, your odds drop to only about ten to one against. And if you invest $10 million in tickets, the odds become approximately two to one in your favor! Most people can't afford to buy millions of tickets. Those who *do* have that kind of money usually don't dump it on the lottery, because you almost always end up losing.

But in Drosnin's game, you don't have to win more than you lose. You don't even have to break even. All you need for success is to win *every once in a while.* And, you can have what amounts to millions of "free lottery tickets" simply by running a computer program, or poring over crossword-puzzle printouts. Drosnin routinely tests *billions* of letter sequences for matches to selected words or names, and goes to steps of many thousands. By using steps lower than 1,000 only, I limited myself to using

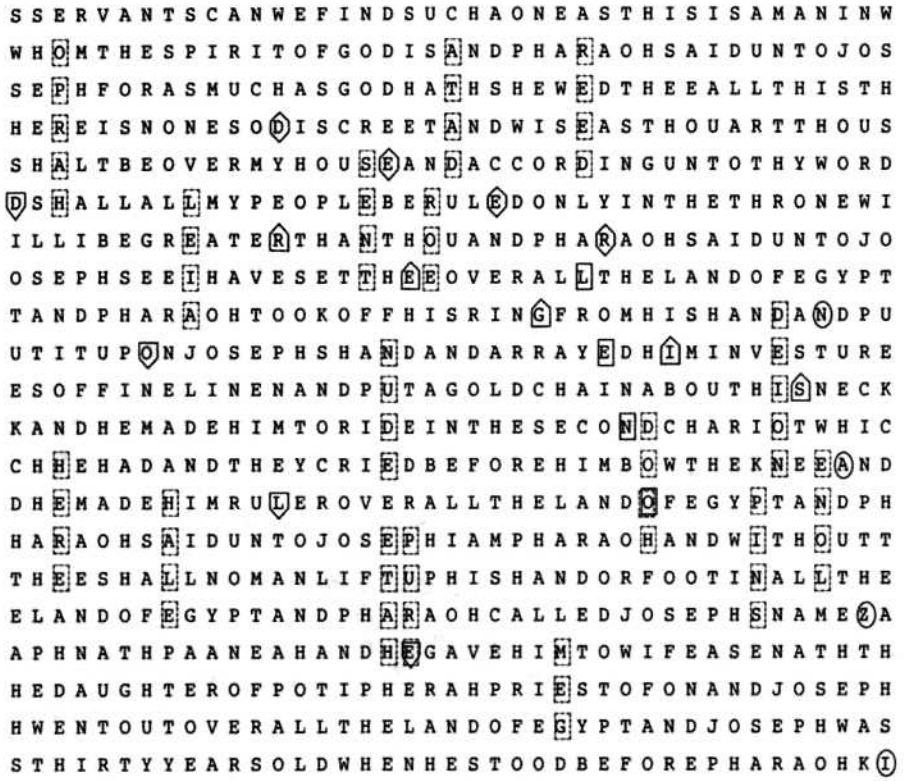

Figure10. Genesis 41:38–46, multiple matches, step = 40.

only about 3 percent of the potential of Genesis or *Edwards*. Brendan McKay (in personal communication) showed me how to find hidden words much more efficiently, and a search of KJV Genesis at all possible steps for my list of twenty-five names came up with over one million additional matches. These include six hits for "Clinton," fifteen for "Gardner," three for "Hillary" and "Einstein," and two for "Kennedy."

Conclusion

The promoters of hidden-message claims say, "How could such amazing coincidences be the product of random chance?" I think the real question should be, "How could such coincidences *not* be the inevitable product of a huge sequence of trials on a large, essentially *random* database?"

Once I learned how to navigate in puzzle-space, finding "incredible" predictions became a routine affair. I found "comet," "Hale," and "Bopp" linked in KJV Genesis, along with "forty" and "died," which could be interpreted as an obvious reference to Heaven's Gate. I found "Trinity," "Los Alamos," "atom," and "bomb" encoded together in *Edwards*, in a section containing references to "security," "test," and "anti-fascist." And I found "Hitler" linked to "Nazi" dozens of times in several books. When I set out to engineer a "hidden code" link of "code" and "bogus" in KJV Genesis, I was able to produce sixty closely linked pairs. And every single one of these pairs could fit inside a reasonably sized puzzle.

The source of the mysterious "Bible code" has been revealed—it's *homo sapiens*.

Now somebody go tell Oprah.

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STATEMENT OF OWNERSHIP, MANAGEMENT, AND CIRCULATION (Required by 39 U.S.C. 3685)

Date of filing: September 18, 1997. Title: The SKEPTICAL INQUIRER. Frequency of issue: Bi-monthly. Complete mailing address of known office of publication: 3965 Rensch Road, Amherst, Erie County, NY 14228-2713. P.O. Box 703, Buffalo, Erie County, NY 14226-0703. Publisher: CSICOP, Inc. (Committee for the Scientific Investigation of Claims of the Paranormal), 3965 Rensch Road, Amherst, Erie County, NY 14228-2713. Editor: Kendrick Frazier, 944 Deer Drive NE, Albuquerque, NM 87122. Assistant Editors: Gwen A. Burda and Christine T. Kuzniarek, P.O. Box 703, Buffalo, NY 14226-0703. Owner: CSICOP, Inc. (Committee for the Scientific Investigation of Claims of the Paranormal), 3965 Rensch Road, Amherst, Erie County, NY 14228-2713. P.O. Box 703, Buffalo, Erie County, NY 14226-0703. Known bondholders, mortgagees, and other security holders: None. Aver. no. copies each issue during preceding 12 months: A. Total no. copies (net press run) 49,614. B. Paid and/or requested circulation (1) Sales through dealers and carriers, street vendors and counter sales 15,468 (2) Mail subscriptions 28,832. C. Total paid and/or requested circulation (sum of B[1] and [2]) 44,300 D. Free distribution by mail (samples, complimentary, and other free) 647. E. Free distribution outside mail (by carrier or other means) 667. F. Total free distribution (sum of D and E) 1,314. G. Total distribution (sum of C and F) 45,614. H. Copies not distributed (1) Office use, left over, spoiled 4,000; (2) returns from news agents 0. I. Total (sum of G, H [1] and [2]) 49,614. Percent paid and/or requested circulation 97.12%. Actual no. copies of single issue published nearest filing date: A. Total no. copies (net press run) 53,890. B. Paid and/or requested circulation (1) Sales through dealers and carriers, street vendors and counter sales 14,425 (2) Mail subscriptions 32,300. C. Total paid and/or requested circulation (sum of B[1] and [2]) 46,725. D. Free distribution by mail (samples, complimentary, and other free) 665. E. Free distribution outside mail (by carrier or other means) 650. F. Total free distribution (sum of D and E) 1,315. G. Total distribution (sum of C and F) 48,040. H. Copies not distributed (1) Office use, left over, spoiled 5,850; (2) returns from news agents 0. I. Total (sum of G, H [1] and [2]) 53,890. Percent paid and/or requested circulation 97.26%.

Science, Scientism, and Anti-Science in the Age of Preposterism

We are in danger of losing our grip on the concepts of truth, evidence, objectivity, disinterested inquiry. The preposterous environment in which academic work is presently conducted is inhospitable to genuine inquiry, hospitable to the sham and the fake. Encouraging both envy and resentment of the sciences, it has fed an increasingly widespread and articulate irrationalism.

SUSAN HAACK

> That is preposterous which puts the last first and the first last. . . . Valuing knowledge, we *preposterize* the idea and say . . . everybody shall produce written research in order to live, and it shall be decreed a knowledge explosion.
>
> —Jacques Barzun[1]

There is, to be sure, a lot of misinformation about, and that is, certainly, a problem. But what concerns me is a deeper and more disturbing development: a rising tide of irrationalism, a widespread and increasingly articulate loss of confidence in the very possibility of honest inquiry, scientific or otherwise.

A hundred years or so ago, C. S. Peirce, a working scientist as well as the greatest of American philosophers, distinguished genuine inquiry from "sham reasoning," pseudo-inquiry aimed not at finding the truth but at making a case for some conclusion immovably believed in advance; and predicted that, when sham reasoning becomes commonplace, people

will come "to look on reasoning as merely decorative," and will "lose their conceptions of truth and of reason."[2]

This is the very debacle taking place before our eyes: genuine inquiry is so complex and difficult, and advocacy "research" and politically-motivated "scholarship" have become so commonplace, that our grip on the concepts of truth, evidence, objectivity, inquiry has been loosened. I want to talk about how this disaster came about, and the role played by the phenomenon Barzun calls "preposterism" in encouraging it.

The genuine inquirer wants to get to the truth of the matter . . . whether or not that truth comports with what he believed at the outset . . . and whether or not his acknowledgement of that truth is likely to get him tenure, or to make him rich, famous, or popular.

Pseudo-Inquiry; and the Real Thing

A genuine inquirer aims to find out the truth of some question, whatever the color of that truth. This is a tautology (*Webster's*: "inquiry: search for truth . . ."). A pseudo-inquirer seeks to make a case for the truth of some proposition(s) determined in advance. There are two kinds of pseudo-inquirer, the sham and the fake. A sham reasoner is concerned, not to find out how things really are, but to make a case for some immovably-held preconceived conviction. A fake reasoner is concerned, not to find out how things really are, but to advance himself by making a case for some proposition to the truth-value of which he is indifferent.

Neither sham nor fake inquiry is really inquiry; but we need to get beyond this tautology to understand what is wrong with sham and fake reasoning. The sham inquirer tries to make a case for the truth of a proposition his commitment to which is already evidence- and argument-proof. The fake inquirer tries to make a case for some proposition advancing which he thinks will enhance his own reputation, but to the truth-value of which he is indifferent. (Such indifference is, as Harry Frankfurt once shrewdly observed, the characteristic attitude of the bullshitter.)[3] Both the sham and the fake inquirer, but especially the sham, are motivated to avoid examining any apparently contrary evidence or argument too closely, to play down its importance or impugn its relevance, to contort themselves explaining it away. And, since people often mistake the impressively obscure for the profound, both, but especially the fake reasoner, are motivated to obfuscate.

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The genuine inquirer wants to get to the truth of the matter that concerns him, whether or not that truth comports with what he believed at the outset of his investigation, and whether or not his acknowledgement of that truth is likely to get him tenure, or to make him rich, famous, or popular. So he is motivated to seek out and assess the worth of evidence and arguments thoroughly and impartially. This doesn't just mean that he will be hard-working; it is a matter, rather, of willingness to re-think, to re-appraise, to spend as long as it takes on the detail that might be fatal, to give as much thought to the last one percent as to the rest. The genuine inquirer will be ready to acknowledge, to himself as well as others, where his evidence and arguments seem shakiest, and his articulation of problem or solution vaguest. He will be willing to go with the evidence even to unpopular conclusions, and to welcome someone else's having found the truth he was seeking. And, far from having a motive to obfuscate, he will try to see and explain things as clearly as he can.

This is not to deny that sham or fake reasoners may hit upon the truth, and, when they do, may come up with good evidence and arguments. Commitment to a cause, desire for reputation, are powerfully motivating forces which may prompt energetic intellectual effort. But the intelligence and ingenuity that will help a genuine inquirer to figure things out, will help a sham or fake inquirer to suppress unfavorable evidence or awkward arguments more effectively, or to devise more impressively obscure formulations.

Nor is this to deny that genuine, disinterested inquirers may come to false conclusions or be led astray by misleading evidence or arguments. But an honest inquirer will not suppress unfavorable evidence or awkward arguments, nor disguise his failure with affected obscurity; so, even when he fails, he will not impede others' efforts.

Of course, real human beings do not conform neatly to the three types I have distinguished; their motives are generally pretty mixed, and they are capable of many degrees and kinds of self-deception. A good environment for intellectual work will encourage genuine inquiry and discourage the sham and the fake; and will enable mutual scrutiny among workers in a field, so that the contributions to knowledge that sham and fake reasoners sometimes make despite their dubious motivation get sifted from the dross. Honest scrutiny is best; but scrutiny even by other sham or fake reasoners with different axes to grind may be effective as a way of exposing error, confusion, and obfuscation. A bad environment will encourage sham and fake inquiry, and/or impede mutual scrutiny.

The environment will be hospitable to good intellectual work insofar as incentives and rewards favor those who work on significant issues, and whose work is creative, careful, honest and thorough; insofar as journals, conferences, etc., make the best and most significant work readily available to others working in the area; insofar as channels of mutual scrutiny and criticism are open, and successful building on others' work is

encouraged. The environment will be inhospitable insofar as incentives and rewards encourage people to choose trivial issues where results are easily obtained, to disguise rather than tackle problems with their approach, to go for the flashy, the fashionable, and the impressively obscure over the deep, the difficult, and the painfully clear; insofar as the availability of the best and most significant work is hindered rather than enabled by journals and conferences bloated with the trivial, the faddy, and the carelessly or deliberately unclear; insofar as mutual scrutiny is impeded by fad, fashion, obfuscation, and fear of offending the influential.

I don't see how to avoid the conclusion that the environment in which academic work is presently conducted is an inhospitable one. I think this is true for all disciplines; but I shall focus, henceforth, primarily on philosophy—the discipline I know best, and the discipline in which disillusionment with the very idea of inquiry has been most overtly articulated.

A Preposterous Environment

"Everybody shall produce written research in order to live"; Barzun exaggerates, but not much. Everybody aspiring to the tenure-track, tenure, promotion, a raise, a better job, or, of course, academic stardom, had better produce written, published, research. "[A]nd it shall be decreed a knowledge explosion"; again, Barzun exaggerates, but, again, not much. It *is* pretty much taken for granted that this explosion of publications is a good thing, that it represents a significant contribution to knowledge.

Yet much of what is published is, at best, trivial stuff, putting me in mind of that observation: "Rubbish is rubbish, but the history of rubbish is scholarship." Seriously, though: few if any of us will have a truly original idea every few years, let alone every few months; genuinely important philosophical work usually takes years of frustration and failure. Nevertheless, we not only half-pretend that this written research that everybody must produce in order to live is mostly worthwhile; we breathe an atmosphere of puffery, of announcements in paper after paper, book after book, that all previous work in the area is hopelessly misconceived, and here is a radically new approach which will revolutionize the whole field. How did this atmosphere of preposterous exaggeration come about?

It is no longer possible to do important scientific work with a candle and a piece of string; ever more sophisticated equipment is needed to make ever more recherché observations. Research in the sciences has become very expensive; a culture of grants-and-research-projects has grown up; and science has become, *inter alia*, big business. The consequences for science itself are not altogether healthy: think of the time spent "writing grants," not to mention attending seminars on "grant writing," of the temptation to shade the truth about the success or importance of one's project, or of the price paid in terms of the progress of science when a condition of this or that body's supporting the research is that the results be withheld from the rest of the scientific community. But when disciplines like philosophy, where serious work requires, not fancy equipment, but only (only!) time and peace of mind, mimic the organization of the sciences, when the whole apparatus of grants-and-research-projects becomes so ordinary that we scarcely notice how extraordinary it is, when we adapt to a business ethos, the consequences are far worse.

Why worse? In part because in philosophy the circumpressure of facts, of evidence, is less direct; in part because there is no real analogue of the kind of routine, competent, unexciting work that gets the scientific details filled in; in part because in philosophy the mechanisms of mutual scrutiny are perhaps more clogged and probably more corrupted.

In part because it is so intellectually impressive, in part because it is so useful, and in part, no doubt, because it is so expensive, science enjoys enormous prestige, in which the rest of us would dearly like to share. And, inevitably perhaps, in consequence of universities' having become such big businesses, many university administrators have become enamored of a business management ethos which values "entrepreneurial skills," i.e., the ability to obtain large sums of money to undertake large research projects, above originality or depth, and which encourages conceptions of "efficiency" and "productivity" more appropriate to a manufacturing plant than to the pursuit of truth.

In disciplines like philosophy, feeling ourselves the poor relations in such a culture, we have adapted as best we could. Our adaptation has encouraged a kind of philosophical entrepreneurship which often diverts time and effort from real work, and is sometimes, to speak plainly, nothing more than philosophical hucksterism: centers for this and that, new journals for the legitimation and promotion of the latest fad, projects requiring secretaries, research assistants, or, better yet, more expensive and powerful computers or, best of all, a laboratory.

A good environment for intellectual work will encourage genuine inquiry and discourage the sham and the fake.

This adaptation damages the fragile intellectual integrity demanded by the genuine desire to find out how things are. It is part of the meaning of the word "research" that you don't know how things will turn out. Yet the whole apparatus of grants-and-research-projects, and the conception of productivity and efficiency it fosters, discourages candid acknowledgement that one may work for years at what turns out to be a dead end, and constitutes a standing encouragement to exaggeration, half-truth and outright dishonesty about what one has achieved. In principle, you might fill out the application explaining what important breakthroughs your work is going to achieve, and fill out the report, later, explaining what important breakthroughs your work actually did achieve, without your private estimation of the worth of your work being affected. In practice, inevitably, intellectual integrity is eroded.

It has been a poor adaptation which significantly affects what kinds of work get done, channeling effort into those

areas likeliest to attract funding. This is surely part of the explanation of the popularity of interdisciplinary work, especially work which allies philosophy with more prestigious disciplines such as cognitive psychology or artificial intelligence or medicine, etc.

Nor is it unduly cynical to suspect that it also significantly affects what kinds of conclusion are reached. Where effort is directed by the hope of large grants into, say, the border territory of epistemology with cognitive science, the probability rises that the conclusion that will be reached is that long-standing epistemological questions can be quickly resolved or as quickly dissolved by appeal to this or that work in cognitive science; where effort is directed by the hope of large grants into, say, the relevance of feminism to philosophy of science, the probability rises that the conclusion that will be reached is that feminism requires us, as Sandra Harding preposterously puts it, to "reinvent science and theorizing." (Challenged, nearly a decade later, to say what breakthroughs feminist science had achieved, Harding replied that, thanks to feminist scientists, we now know that menopause isn't a disease. Gosh.)[4] No one is so naive as to imagine that large grants might be forthcoming to show that cognitive science *has no* bearing on those long-standing epistemological questions, or even that its bearing is (as I believe), though real enough, oblique and undramatic; or to show that (as I believe) feminism *has no* relevance to the theory of scientific knowledge.

The whole apparatus of grants-and-research-projects . . . discourages candid acknowledgement that one may work for years at what turns out to be a dead end, and constitutes a standing encouragement to exaggeration, half-truth and outright dishonesty about what one has achieved.

The psychological mechanisms here are quite subtle. Simple, downright dishonesty is the exception; some degree or other of self-deception is the rule. And this is likely, naturally, to leave a residue of ambivalence, such as one can hear in this plea for the psychologization of epistemology: "[a] return [to a psychologistic conception of epistemology] is especially timely now, when cognitive psychology has renewed prestige. . . ." The relevance or otherwise of psychology to epistemology is a hard meta-epistemological question: on which, needless to say, the prestige of cognitive psychology has no bearing.

Still, all the puffery, the attempts to promote oneself or one's area, approach, or line, this academic boosterism, might be *only* a waste of time if, eventually, it all came out in the wash of mutual scrutiny and criticism. The waste of time, talent, and energy is significant; what real work might have been done by those who feel obliged, instead, to point out the absurdities of the latest fad? But, instead of efficient mechanisms of communication and mutual scrutiny, we have a mind-numbing clamor of publications, conferences, meetings, of "empty books and embarrassing assumptions,"[5] making it close to impossible to hear what is worthwhile.

The director of Rutgers University Press admits that "[w]e are . . . part of the university personnel system and . . . often publish books whose primary reason for existence is the author's academic advancement, not the advancement of knowledge."[6] The new editor of the *American Philosophical Quarterly* writes that publishing in the journals has become less a way to communicate significant ideas than a form of professional certification, and that being adequately informed in one's field of course no longer requires that one actually *read* all that stuff.[7] Even more startling than the candor of his observations about the real role of the journals is the blandness of his assumption that publication-as-professional-certification is perfectly OK. But it isn't perfectly OK; it gets in the way of—what is more than ever urgently necessary in a culture that positively encourages sham and fake reasoning—the mutual scrutiny that might separate the worthwhile from the dross.

Between 1900 and 1960, about forty-five new philosophy journals were founded in the U.S., Canada, and Britain; between 1960 and 1990, about 164. Inevitably, it has become impossible, except by sheer luck, to find the good stuff; inevitably, championship of a simple, startling idea, even, or perhaps especially, an egregiously false or an impressively obscure idea, has become a good route to reputation and money—as has the self-serving variation on a fashionable party line. Inevitably, too, finding referees with the necessary expertise, time, patience, and integrity has become harder, the power of editors to make or ruin careers has grown, and once-idealistic young philosophers begin to say to themselves, "they like controversy in their journal, so why bother spelling out the qualifications?". . .

And, inevitably, as it becomes harder to make oneself heard in the journals, one has to publish a book; and, as that book-published-by-a-reputable-academic-press becomes a requisite for tenure, we face the ever more bloated publishers' catalogues filled with ever more exaggerated descriptions and endorsements. And, inevitably, once again, it becomes impossible, except by sheer luck, to find the good stuff, and . . . But I won't bore you by writing the previous paragraph all over again!

It is not unheard of to find that the book of which a review has just appeared, having sold the few hundred copies which, these days, philosophy books typically sell, is already, a couple of years after publication, out of print. Better, then, from the point of view of sheer self-preservation, let alone of impressing Deans, etc., with one's "scholarly productivity," not to spend too long writing a book. How absurd, after all, to spend ten years writing a book which, if you are lucky, five hundred people might read, and the life of which, if you are lucky, might be four or five years.

It used to be an important role of the academic presses to publish significant books too specialized to be economic. Increasingly, however, as subsidies from their universities have shrunk, university presses seek to publish books they believe will make money. This too is discouraging, to put it mildly, to

the investment of effort in difficult problems. Better, from the point of view of making oneself heard, to write the kind of book that might interest a trade publisher, or at least the kind of book that will get reviewed in the non-academic press. And this too, inevitably, favors the simple, startling idea, even, or perhaps especially, the startlingly false or impressively obscure idea. . . . But I promised not to bore you by writing that paragraph all over again!

Like books and journals, conferences might be, and occasionally are, important channels of communication. But we are all familiar with the reality that your home institution will pay your expenses *if* you give a paper; with the conference announcements which discreetly let it be known that, so long as you pay the large registration fee, your paper will be accepted; with the stupefying programs of day after day of umpteen parallel sessions; with the twenty-minute, the twelve-minute, even, of late, the ten-minute presentation; with the extent to which conferences have become less a matter of communication than of "contacts," of "exposure," and, of course, of expenses-paid trips to agreeable places. We have adapted to these realities, in part, by self-deceptively over-rating the usefulness of what we like to call "stimulation," and under-rating the need for time, peace of mind, mature reflection.

I am reminded of Santayana's character-sketch of Royce: an "overworked, standardised, academic engine, creaking and thumping on at the call of duty or of habit, with no thought of sparing itself or anyone else."[8] Preposterism can only too easily turn the best of us into just such overworked, standardized, academic engines—and can only too easily turn the worst of us into purveyors of philosophical snake-oil.

The Perils of Preposterism

Thus far it may seem that the perils of preposterism are much the same for philosophy as for the humanities generally. But philosophy is the discipline to which it falls to inquire into inquiry itself, its proper conduct and necessary presuppositions. And that responsibility exposes us to a particular peril.

Recent philosophy manifests two tendencies, on the face of it radically opposed to each other, which both result in part from our adaptation to a "research ethic" more appropriate to the sciences than to the humanities: scientism, i.e., linking philosophy too closely, or inappropriately, to the sciences; and radical critique of the sciences as no more than ideology masked by rhetorical bullying in the form of appeals to "rationality," "objectivity," and so forth. The former is the effect of envy, the latter of resentment, of the success of the sciences.

One manifestation of science-envy is the mathematical or logical pseudo-rigor with which much recent philosophical writing is afflicted. This, to speak bluntly, is a kind of affected obscurity. Not that recourse to the languages of mathematics or logic never helps to make a philosophical argument or thesis clearer; of course, it does. But it can also stand in the way of real clarity by disguising failure to think deeply or critically enough about the concepts being manipulated with impressive logical sophistication. And it has come to be, too often, what Charles Sykes calls "Profspeak"—using unnecessary symbols to convey a false impression of depth and rigor.

Science-envy is manifested also by those who—hoping to enhance their prestige by close association with the sciences—contort themselves in attempts to show that this or that philosophical problem can be quickly settled by some scientific result, or to displace philosophical problems in favor of scientific ones. The result is at best a covert change of subject, at worst a self-undermining absurdity.[9] No scientific investigation can tell us whether science is epistemologically special, and if so, how, or whether a theory's yielding true predictions is an indication of its truth, and if so, why, and so on; yet, unless these were not only legitimate questions, but legitimate questions with less-than-skeptical answers, it is incomprehensible how one could be justified, as the most ambitious style of scientism proposes, in doing science instead of philosophy.

Preposterism can only too easily turn the best of us into overworked, standardized, academic engines . . . and the worst of us into purveyors of philosophical snake-oil.

Now one begins to see why the revolutionary scientism encountered in contemporary philosophy often manifests a peculiar affinity with the anti-scientific attitudes which, as I conjecture, are prompted by resentment, as scientism is prompted by envy, of the sciences. Both parties have become disillusioned with the very idea of honest inquiry, of truth-seeking. One hears from Paul Churchland, on the scientistic side, that, since truth is not the primary aim of the ceaseless cognitive activity of the ganglia of the sea-slug, it should maybe cease to be a primary aim of science, and even that talk of truth may make no sense; from Richard Rorty, on the anti-science side, that truth is just what can survive all conversational objections, and that the only sense in which science is exemplary is as a model of human solidarity. One hears from Patricia Churchland, on the scientistic side, that "truth, whatever that is, definitely takes the hindmost"; from Sandra Harding, on the anti-science side, that "the truth—whatever that is!—will not set you free." One hears from Steven Stich, on the scientistic side, that truth is neither intrinsically nor instrumentally valuable, and that a justified belief is one his holding which conduces to whatever the believer values; from Steve Fuller, on the anti-science side, that good scholarship is a matter simply of "who[m] you are trying to court in your work."[10]

Remember Peirce on what will happen if pseudo-inquiry becomes commonplace: "men come to look upon reasoning as mainly decorative. . . . The result of this state of things is, of course, a rapid deterioration of intellectual vigor. . . . [M]an loses his conceptions of truth and of reason. If he sees one man assert what another denies, he will, if he is concerned, choose his side and set to work . . . to silence his adversaries. The truth for him is that for which he fights."[11]

I can match neither Peirce's prescience nor his eloquence, only add a little circumstantial detail to his diagnosis. Prepost-

erism encourages sham and fake reasoning. In the humanities, it also encourages envy of science, and thus scientism and a *certain kind of irrationalism, and resentment of science,* and thus an only-slightly-different kind of irrationalism. Within philosophy, furthermore, as the discipline to which the task of articulating the nature and goals of inquiry falls, the ubiquity of sham and fake reasoning has induced a factitious despair of the possibility of attaining truth by investigation—the despair revealed in the astonishing outbreak of sneer quotes with which so much recent philosophical writing expresses its distrust of "truth," "reality," "facts," "reason," "objectivity," etc.

When sham and fake reasoning are ubiquitous, people become uncomfortably aware, or half-aware, that reputations are made as often by clever championship of the indefensible or the incomprehensible as by serious intellectual work, as often by mutual promotion as by merit. Knowing, or half-knowing, this, they become increasingly leery of what they hear and read. Their confidence in what passes for true declines, and with it their willingness to use the words "truth," "rationality," etc., without the precaution of scare quotes. And as those scare quotes become ubiquitous, people's confidence in the concepts of truth and reason falters, and one begins to hear (from Richard Rorty): "I do not have much use for notions like . . . 'objective truth'," "'true' [is] a word which applies to those beliefs upon which we are able to agree," or (from Bruno Latour and Steve Woolgar): "a fact is nothing but a statement with no modality . . . and no trace of authorship," or (from Steve Fuller): "I don't see any clear distinction between 'good scholarship' and 'political relevance.'"[12]

The inference from the true premiss that what passes for truth, objective fact, rational argument, relevant evidence, etc., is often no such thing, to the false conclusion that the notions of truth, objectivity, rationality, evidence, etc., are humbug, is obviously invalid. But it has become so ubiquitous that it deserves a name; I call it "the 'passes for' fallacy."[13] The "passes for" fallacy is not only fallacious, but self-defeating; for if the conclusion were true, one could never have grounds for accepting the premiss from which it is supposedly derived. It should come as no surprise, therefore, to read (in Stephen Cole): "Given that facts can easily become errors, what sense does it make to see what is at Time 1 a 'fact' and at Time 2 an 'error' as being determined by nature?", and then, a few pages later, "the most important evidence in favor of my position is the fact that . . . ,"[14] or (in Ruth Bleier): "[I criticized various studies] for their sloppy methods, inconclusive findings, and unwarranted interpretations," and then, a few pages later, "there must be an irreducible . . . distortion or biasing of knowledge production simply because science is a social activity performed by human beings in a specific cultural . . . context."[15]

Sad to say, this last quotation is quite typical of much recent "feminist scholarship." The vast recent literature of feminist approaches to this or that area of philosophy—ethics, epistemology, philosophy of science, philosophy of language, lately even logic—is a particularly striking manifestation of the consequences of preposterism. Reading in this vast literature, one can hardly fail to notice how endlessly it is repeated that feminism has radical consequences for this or that area, and *how often those radical consequences turn out to be trivial, or* obviously derivative from some male philosopher, or manifestly false; by how determinedly practitioners avert their attention from serious criticisms, and how lavishly they praise the work of others of their own persuasion. Pondering on how this came about, one can hardly fail to think how many reputations and careers, how many centers, programs, conferences, journals, depend on the legitimacy of appealing to the feminist perspective on this or that. And one's darkest suspicions are confirmed when, in a moment of remarkable candor, Sandra Harding tells us that "[m]en who want to be 'in feminism' . . . can teach and write about women's thought, writings, accomplishments. . . . They can criticize their male colleagues. They can move material resources to women . . . ."[16]

My point isn't that the feminist-philosophy bandwagon is peculiarly awful; I don't know that it is *peculiarly* awful, and in any case my point is not to pick on the feminists, but to articulate how the epidemic of sham and fake reasoning encouraged by preposterism has loosened our grip on the concept of inquiry. The perception among these radical feminist philosophers that their profession is profoundly corrupt is, at worst, exaggerated; their profession *is* rife with pseudo-inquiry, and publication, promotion, stardom, etc., *are* cut loose from merit. And this perception of the ubiquity of pseudo-inquiry has encouraged the despair of the possibility of honest investigation ubiquitous in philosophy today.

Such a "factitious despair" is bound, as Francis Bacon eloquently put it long ago, to "cut the sinews and spurs of industry." (And all, as he observed, for "the miserable vainglory of having it believed that whatever has not yet been discovered and comprehended can never be discovered and comprehended hereafter.")[17]

But unbiased investigation is *not* impossible; only difficult, demanding, painful—and of almost incalculable value to us humans. Which is why I end this lay sermon with a text, from George Eliot's *Felix Holt the Radical*:

> Truth is the precious harvest of the earth.
> But once, when harvest waved upon a land,
> The noisome cankerworm and caterpillar,
> Locusts, and all the swarming, foul-born broods,
> Fastened upon it with swift, greedy jaws,
> And turned the harvest into pestilence,
> Until men said, What profits it to sow?

Notes

1. Jacques Barzun, *The American University*, Harper and Row, New York, 1968, p. 221.

2. *Collected Papers*, eds. Charles Hartshorne, Paul Weiss, and Arthur Burks, Harvard University Press, Cambridge, Mass., 1931–58, 5.520 (c. 1905), 6.6 (c. 1903), 1.128 (c. 1905). References by volume and paragraph number.

3. Harry Frankfurt, "On Bullshit," in *The Importance of What We Care*

PREPOSTERISM
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The Elemental Man

An Interview with Glenn T. Seaborg

He discovered plutonium and co-discovered at least nine other elements. He is considered one of the founding fathers of nuclear medicine and is the most prolific discoverer of radioisotopes used in diagnosis and treatment. He explained how the transuranium elements fit into the periodic table. He received the 1951 Nobel Prize for chemistry. He has served on the faculty of the University of California, Berkeley, since 1939. On August 30, 1997, element 106 was officially named "seaborgium" after him.

Glenn T. Seaborg has also always been a very public man of science. For decades, while remaining an active research scientist, he has been the prototypical scientific statesman. He was chairman of the Atomic Energy Commission for ten years during the Kennedy, Johnson, and Nixon administrations and has written a trilogy of books about those years. He has had a lifelong interest in international cooperation in science, history of science, and nuclear arms control.

In addition, he has worked to improve undergraduate science education. He was a member of the National Commission on Excellence in Education that published A Nation at Risk *in 1983, and for thirty years he served as chairman of the board*

Nobel laureate Glenn Seaborg wearing his periodic table tie. (Photo courtesy Sandia National Labs)

of Science Service, which publishes Science News *and runs the annual Westinghouse Science Talent Search that identifies and honors the brightest high school science students in the nation.*

*Seaborg, a CSICOP fellow, is co-chairman (with Steve Allen) of CSICOP's new Council for Media Integrity. The Council seeks to encourage the media and entertainment industries toward more scientific responsibility in programming dealing with science, fringe-science, pseudoscience, and the paranormal (*SI, *May/June 1997).*

He was interviewed in Los Angeles by SKEPTICAL INQUIRER *editor Kendrick Frazier and West Coast bureau chief Tom Genoni Jr.*

SI: Glenn, I notice you're wearing your periodic table tie. How many of the elements in the periodic table have you had a role in discovering?

SEABORG: Ten or eleven. I say "or eleven" because there's a little controversy over the last one, which is the element with the atomic number 110. The elements are plutonium, 94; americium, 95; curium, 96; berkelium, 97; californium, 98; einsteinium, 99; fermium, 100; mendelevium, 101; nobelium, 102; and seaborgium, 106.

SI: What is the status of the name "seaborgium"? I know it hasn't been quite officially adopted yet.

SEABORG: Well, the Commission on Nomenclature of Inorganic Chemistry, at their meeting in 1994, rejected the name "seaborgium"—this is a commission of the International Union of Pure and Applied Chemistry—you know, IUPAC. They rejected the name "seaborgium" for the silly reason that I'm still alive, and there was an almost universal revulsion at that decision. They've reconsidered it at subsequent meetings and their present tendency is now to accept the name "seaborgium." Actually, there have been a number of elements named after living people, and it has never been a criterion before. The chances are quite good now that the name "seaborgium" will be accepted, but it won't be finally determined until the next meeting of the IUPAC general assembly to be held in Geneva, Switzerland. [On August 30, 1997, IUPAC, meeting in Geneva, did officially adopt "seaborgium," symbol Sg, as the name of element 106, and on September 7 the American Chemical Society's nomenclature committee also approved the name.]

SI: You have had a long and fruitful scientific career. It extends over at least six decades. What are several of the highlights?

SEABORG: Well, I think the discovery with my coworkers of the isotopes that have become workhorses of nuclear medicine—technetium-99m and iodine-131 and cobalt-60 and a number of others. Nuclear medicine is playing an increasingly important role in medicine these days. Of the forty million people admitted to hospitals each year, about a third of them are given the benefit of diagnoses and treatments with radioactive isotopes in the field of what you call nuclear medicine. Another high point, I suppose, would be the discovery, with my coworkers, of plutonium, which has been used as the explosive ingredient of the atomic bomb, but which is also a source of nuclear energy in nuclear power reactors and also, in one form, a source of the energy that powers the instruments that send information back to Earth from the space program's planetary-probe spacecraft, the fly-bys of Jupiter, Saturn, Uranus, and Neptune, etc. Also the discovery of the ten or eleven elements that I mentioned. I suppose those would be the highlights of my scientific career.

SI: Is there any way to summarize how you have seen the progress of science or the public attitude toward science change in the six decades?

SEABORG: Well, of course, when I started back in 1934, my first year as a graduate student at Berkeley, the situation was entirely different than it is today. We were very limited in the amount of money for support of our scientific research and for instrumentation. With the advent of World War II and the critical role that science played in the winning of that war, science began to be viewed in a new light after the war, and we had ample support in the ensuing years, particularly during the years of the cold war. Now we're reaching a point again where there's a question about how much support is going to go for basic research. I think, of course, that it would be a mistake to cut back on the support for basic research because we live in an age of science and technology; and to hold our own in an increasingly competitive world, we need to stay abreast in science and technology.

SI: Let's talk about the new Council for Media Integrity. What do you see as the positive and negative aspects of the media's treatment of science?

SEABORG: Well, on the whole, there are a number of science writers who do a pretty good job, particularly those associated with major newspapers like *The New York Times*. But there is also, unfortunately, a whole world of what you might call pseudoscience, false depictions of science and its impact upon society. I think perhaps this can be counteracted, at least to

some extent, by groups like the Council for Media Integrity. Also, another way of countering it is to renovate our science education programs, particularly precollege science education, so that we are able to educate people to the point where they have a sufficient degree of scientific literacy to understand what's going on. This is very difficult to do. I was a member of the National Commission on Excellence in Education that produced a report, *A Nation at Risk*, that came out with a number of recommendations on how to upgrade and change the precollege curriculum in science and mathematics. This has made a little impact, but we still have a long way to go. I think one of the things we need to do, and this is very difficult, is to change the way we train our teachers of science and mathematics. There's too much emphasis today in the schools of education on the methods of teaching to the exclusion of emphasis on knowledge of subject matter. I think teachers need to be trained more in subject matter. When you have a teacher who has not been trained in science teaching a subject that he or she is not very interested in, it results in the students' losing interest. Actually, the indications are that students begin in the very early grades with a potential interest in science, but they're turned off after a few years, and then it's very difficult to bring them back. There are, of course, a large number of teachers who are trained in subject matter and who are very dedicated, but not a large enough proportion, in my view.

SI: Is the problem in getting young people interested in scientific careers? Or is it in training scientists, or is it in training the general public—who become the doctors, lawyers, teachers—in the general attitude of science?

SEABORG: There are really three categories. One is in training and interesting young people about science or technology as a career. That problem is not as serious as the other, because there always seem to be a certain number of people who are interested in going into science as a career. But another area is the general one of training people to be competent in today's workplace, which involves having a certain knowledge of science and technology in order to be able to perform effectively. And that is where a change in the method of teaching is very important. But then there's a third area. In today's world, we need a general population that has a certain degree of scientific literacy. There are so many problems today that are based on some knowledge of science and technology that even the problem of voting intelligently requires a degree of proficiency in these subjects, and *that* we don't have in the general public. And of course we also need a little more help from the news media in order to provide encouragement and to provide accurate descriptions of scientific phenomena.

SI: How worrisome is it in a democracy, in a complex society like we have today, if large sectors of the general public really can't understand scientific and technological issues well enough to, say, make recommendations to their political leaders?

SEABORG: It's quite worrisome, and it could lead to a deleterious effect upon our future. And also it could, from a practical point of view, lead to a deterioration of our competitive position in an increasingly technological world. Other countries apparently are changing or have changed their precollege educational system to meet the challenge better than we in the United States have done so far.

SI: Why is it that in the United States scientific education at the graduate and postgraduate level is universally admired and is a great draw for people coming from all over the world to get scientific training in the United States? How did that happen, and why don't we have the same level of quality at the secondary school level?

SEABORG: That's the first category I mentioned, the scientists. There are apparently a number of people who become interested in science no matter what the obstacles. They're just intrigued by it, and they can cope with the system and make their way. We have, therefore, a good complement of people in the sciences who go on to graduate school and get higher degrees and then go on into the universities and conduct research and so forth. In that area the United States is doing pretty well. The problems are in the other areas—training people adequately to perform effectively in an increasingly technological/industrial society and educating people sufficiently in science so they can perform as citizens, vote effectively on propositions that require some scientific background.

SI: You have always devoted a certain fraction of your time to youngsters in science. You committed yourself to judging in the Science Talent Search each year for Science Service. You are a Nobel laureate scientist; you could have kept to concerns in the academic and scientific community. Why have you always been interested in encouraging young people in science?

We need more scientists willing to communicate to the general public the essence of science and the values of science.

SEABORG: As you've indicated, I've served as chairman of Science Service actually for about thirty years, and they sponsor the Science Talent Search each year, and the International Science and Engineering Fair, and publish the weekly journal *Science News*. It's rather difficult to answer your question. This does seem to me important. I guess I first became concerned about the general problem in the 1950s. At the beginning my interest had more to do with our country holding its own in the Cold War. With the advent of Sputnik in October of 1957 it became clear that there was a possibility that the Soviet Union was getting ahead of us. That was an incentive at that time, although I think we were probably over-concerned and the problem of the Soviets getting ahead of us was not as serious as it seemed to us at that time.

SI: In retrospect, you could say that.

SEABORG: Yes, in retrospect.

SI: What is it about science that brought you joy and delight?

SEABORG: Oh, I didn't have any interest in science at all until my junior year in high school. I went to high school in Watts, California. It had nothing to do with integration. I had no high school in the neighboring town where I was living, so I was bused into Watts. I looked at the courses in general

New Element Names

On August 30, 1997, the International Union of Pure and Applied Chemistry (IUPAC) approved the following names for elements 104 through 109:

104	*rutherfordium*	**Rf**
105	dubnium	**Db**
106	seaborgium	**Sg**
107	bohrium	**Bh**
108	hassium	**Hs**
109	meitnerium	**Mt**

science in the freshman year and biology in the sophomore year and thought they weren't interesting. I decided to be a literary major. Then it was pointed out to me in my junior year that if I didn't take a laboratory course I wouldn't be eligible for admission to the tuition-free state university, UCLA.

So I took chemistry, and my chemistry teacher, a man by the name of Dwight Logan Reid, just turned me on. My whole attitude was "My God! Why hasn't anybody told me about these things?" It was just the idea, I guess, the adventure of it, of making discoveries, uncovering things for the first time. It was exciting. Then in my senior year I took physics, and I was even more interested in physics than in chemistry. But when I went to UCLA, I majored in chemistry because there was really no discernible future in physics in those days. You could not get a job in industry as a physicist. I decided to major in chemistry so that if I had to go into industry for a position upon graduation, I'd at least be eligible. But I did want to go on to get a university position. I did my graduate work at Berkeley in chemistry, but I did my research in nuclear physics. You could do that at the University of California at Berkeley, probably the only school in the country where that was possible. So I have my Ph.D. in chemistry, but I've been working in nuclear physics all of my career. Having the expertise in chemistry has enabled me to make discoveries applying chemistry to nuclear physics, such as the chemical identification of new elements. So I've had the advantage of being able to conduct my research on the borderline between chemistry and physics. But to answer your question, it's just the excitement of it, the adventure of it. What I like to say is that my whole life I've been paid for doing what I want to do. That's pretty unusual. You know, every day that I've gone to work—if you want to use that term—I get paid for doing exactly what I want to do. There aren't very many people who can say that.

SI: Pretty ideal situation.

SEABORG: Yes.

SI: You have always seemed to take on the role of what you might call the scientific statesman. You've served ten or eleven presidents as consultant or science advisor, you were chairman of the Atomic Energy Commission [AEC], and despite your great knowledge in nuclear chemistry you maintained a breadth of interests. What is the responsibility of scientists in that regard? Should all scientists do this or does it just have to be certain ones?

SEABORG: I wouldn't say that every scientist should do this, but I do think that more scientists should. If we're going to solve our general problems, including the problem of education as defined earlier, I think we need more scientists to become involved. We need more scientists willing to communicate to the general public the essence of science and the values of science. I can't tell you exactly why I've become involved in so many ways with so many presidents, but it did seem like the thing to do at the time, and I was given the opportunity. But where I might have differed from others who have done that, I've also maintained my connection with science. All of my life I've continued my science. After my ten years in Washington as chairman of the Atomic Energy Commission, when I had the opportunity to go on—I had offers for maybe fifteen university presidencies and other heads of corporations—I decided to go back to the University of California and do research, which I think is really the highest profession of all. I always have kept in touch, even during my years at the AEC. I kept in touch with research and kept giving talks on my research field.

SI: During the early stages of the cold fusion furor, President Bush asked you to come to the White House and give him your views on the matter. What happened? What did you tell him?

SEABORG: In April 1989, I was called back to Washington to brief George Bush on "cold fusion," the totally unexpected phenomenon that University of Utah scientists announced they had discovered by the simple process of electrolysis of heavy water. A couple of days earlier, the purported co-discoverer of "cold fusion," University of Utah electrochemist Stanley Pons, spoke to an enthusiastic standing-room-only audience of chemists at the semi-annual meeting of the American Chemical Society in Dallas. His talk had attracted so much attention that, apparently, the news had reached the White House. After briefing White House Chief of Staff John Sununu, I went into the Oval Office to brief President Bush on April 14, 1989.

I told him about my role in the discovery of the radioactive iodine that had been used a couple of days earlier to treat his wife, Barbara, and said that a similar treatment with radioactive iodine had effected a miraculous cure for my mother, who was suffering from the same condition as Barbara. The president facetiously said that Barbara is now radioactive and she is not allowed to kiss their dog as long as this condition prevails, but he implied that it didn't seem that this prohibition included himself—the president.

I then went on and described briefly the situation with respect to cold fusion. I indicated that this is not a valid observation—that is, that it is not due to nuclear fusion—but, on the other hand, it must be investigated. The president seemed very interested and convinced by my assessment, and encouraged us very much to go ahead with an investigation.

I might add that the panel I recommended to study the purported "cold fusion" process was created and about six months later came out with a report disputing the validity of the observation, pretty much in line with the view I adopted in my briefing of the president. Also it is interesting to note that President Bush himself, two years later, in May 1991, benefitted from

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Men in Black and *Contact*: Night and Day

We all can use a little taste of wonder.
The question is, what's the best way to inspire it?
In a time when science is seriously misunderstood, the job isn't easy.

EDWARD SUMMER

On the fiftieth anniversary of Roswell, it's not easy to say exactly the right thing about aliens. One can't just debunk them, after all, since those little creatures might well be out there someplace in those billions of stars, waiting to pounce on us, and we wouldn't want to "alienate" them. I've seen *Mars Attacks* and *Independence Day*, so I know what lies in store! This past summer, Hollywood, in an astonishingly "synchronistic" and/or money-hungry moment, has offered us the virtual extremes of the American view of extraterrestrials.

Just to reassure the UFO true believers in the audience, there is no doubt that *Men in Black* will win an Academy Award this year . . . for best documentary film. There is not a single yarn from the vast "aliens among us" mythology that has been missed, right down to the nifty little shiny silver thingees that the government supposedly uses to make witnesses forget what they've seen with a flash of hypnotic

light. A tale of two ultra-secret government agents, "J" and "K," who manage the Earth's population of cleverly disguised outer space aliens and prevent the destruction of Earth, this is without a doubt an empty-headed and entertaining piece of summer fluff with enough clever touches to keep teenagers and fantasy fans attentive and out of trouble for ninety minutes or so. And for those unfamiliar with all the delirious nonsense that attends belief in flying saucers, there's no better way to get an education all in one hyperactive, high-fructose sitting.

By September, *Men In Black* had become the top-grossing motion picture of the year with a box-office take of more than $200 million. Not only was it still playing strongly in many cities after fourteen weeks, but there is little chance that any other film will earn more before the end of the year. The home video release is sure to add to the film's gross, as well as assure its permanent place in the American home.

One can only hope that the other and more notable 1997 motion picture dealing with beings from outer space—*Contact*—finds some niche in the same suburban video collections. *Contact* came and went theatrically in a much shorter period of time and made much less money, but it certainly excited more controversy and polarized reactions than any other film in recent memory.

Since the late 1940s, Hollywood has struggled with the theme of extraterrestrials. The commercial motion picture has almost always chosen the path of least resistance: spaceships, creepy critters, call out the army, save the screaming girl.

There are those few intelligent exceptions. *The Day the Earth Stood Still*, 1951's remarkably moving plea for peace, and *2001: A Space Odyssey* spring to mind. The first is as conventional as they come—spaceship on the White House lawn, robot with death rays—yet it is informed with an intelligence and sensitivity to the human condition that make it as timely as ever.

On the other hand, *2001*, a 1968 MGM release, is a curious work of art that almost defies description. It is, in fact, difficult to appreciate today since it is nearly impossible to see the film in the special Cinerama theatres for which it was designed. In Stanley Kubrick's space odyssey, the history-tweaking aliens are totally unseen (except for the mysterious "slab" artifact), and humanity is reduced to emotionless, expressionless, military types who battle a smooth-talking, hyperintelligent computer in order to enter a "stargate" that reveals a provocative and baffling next stage in human evolution. Awe came from the pure emotional power of Kubrick's single-minded vision. Unhampered even by his co-writer Arthur Clarke's sterling scientific credentials, Kubrick proceeded to break with all manner of cinematic convention and audience preconception to deliver a film that drove many of the baffled members of the audience out of the theatre at the first intermission. Nonetheless, *2001* comes down to us as a genuine masterpiece and ground breaker that has inspired as many folks to careers in NASA as did *Buck Rogers* or *Flash Gordon* decades before and *Star Wars* some years later.

The intervening years have been filled mostly with mindless entertainment based on the extraterrestrial contact theme, some beneficent, some merely diverting or boring: *ET: The Extraterrestrial* and *Close Encounters of the Third Kind* (soon to be re-released) are among the more beneficent of a panoply of genre films that includes such gems as *Plan 9 from Outer Space*.

So when Robert Zemeckis of *Forrest Gump* fame chose to make a film of Carl Sagan's 1985 novel *Contact*, one could only worry.

Sagan undertook to write a book about what an actual first contact with life from somewhere in space might be like, seen from the point of view of a working scientist. Surely, the novel was not the stuff of big box-office sales. It goes without saying that the film version is bowdlerized, shortened, and cheered up a bit in the end. The major changes involve an alteration of the novel's USSR-versus-the-United-States Cold War theme that actual history has rendered out-of-date. The filmmakers—with the direct day-to-day assistance of Sagan and his wife, Ann Druyan—shifted the focus of the story from five international astronauts to a single American scientist, and the Cold War political conflicts to the apparently polarized viewpoints of faith and science.

Contact tells the story of Dr. Ellie Arroway (Jodie Foster) whose father inspires her to a life of scientific research seeking to detect signals from intelligent life in outer space. Her grants cut over and over again, Arroway perseveres until she is finally rewarded with genuine signals. The event immediately becomes not only a media circus, but also a tinder box for the conflicting interests of both international politics and fundamentalist religions, which struggle to control the information received. Once decoded, the signals have instructions for a fantastic

interstellar transport machine, which is finally constructed by an international consortium. After the first machine is destroyed by a religious fanatic, Dr. Arroway is placed in the backup machine, travels in a "pod" through a series of wormholes to a destination deep in interstellar space where she has a brief conversation with a representative of a highly advanced civilization, and returns home to Earth with no concrete evidence of the trip other than her memories. Because of general relativity, the eighteen-hour trip appears to have taken only forty-odd seconds here on Earth, giving credence to the view that it never really took place, but was only a hallucination. Dr. Arroway is faced with a dilemma of credibility.

Perhaps the issues surrounding the politics of faith (present

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in the book but greatly expanded in the movie) have excited the most controversy. Clearly, the film has touched a tender nerve, but it has also resulted in some remarkable breakthroughs in the content of Hollywood storytelling.

In an arena where scientists are traditionally shown as bumbling idiots in white lab coats or Machievellian misfits conniving to destroy us all in the service of their mad fixations, it is astonishing to find a hero who is not only an intelligent, dedicated, compassionate, and believable human being, but a female to boot.

Never in my recollection has there been such an uncompromising motion picture portrayal of a moral, ethical, unswerving practitioner of the scientific method. Nothing, not even emotional arguments about God or promises of fame, will sway her from a commitment to weigh evidence impartially. Nowhere in film have I heard the lines: "I don't know" or "I'm not sure" spoken so sincerely so many times. Not even the last-minute flood of long-blocked emotion at the climax of the film changes her point of view. And in the end—at least in the film—she succeeds.

We have needed for years a role model like Ellie Arroway. American women have long suffered from a cultural milieu that discourages them from scientific and mathematical pursuits, and it is about time we had an onscreen character that young women interested in science can look up to and emulate. And it is about time someone showed the frustrating, incremental process of real scientific discovery accurately with all of the warts and frustrations when the experiments don't go right and the funding disappears overnight.

As for the aliens, *Contact* steers a fragile course between pyrotechnics and restraint. Where Disney's *The Black Hole* foundered on the rocks of total visual and intellectual nonsense when the spaceship was sucked into the black hole, where *Stargate* (of two summers ago) had a reasonable, utilitarian sort of interstellar elevator (and that's all), and where Kubrick stepped over into surreal abstraction to imply things that were, for that time, best left unstated, *Contact* opts for a strikingly literal, scientifically conceived, and, for the most part, understated journey into the exquisitely rendered far reaches of the universe. Even its moments of bathos pay off in positing an alien intelligence embodying both compassion and a specific disavowal of omnipotence: here are creatures—totally unseen—who are technologically advanced beyond humankind's wildest dreams but nonetheless share our bewilderment at the vastness of time and space.

Despite the production's clear attention to scientific detail, the clarity of the script itself, and Sagan's input, the ending of the film—both the actual meeting between Arroway and the alien and the subsequent Congressional investigation of this purported meeting—has stimulated a great deal of controversy and confusion.

One of the first and most startling indications of this controversy came in a review in the July 11, 1997, *New York Times*:

"If heaven exists, what does it look like? Could it be a gleaming tropical beach with snow-white sand and turquoise surf, watched over by a fireworks of wheeling golden stars?

"*Contact*, Robert Zemeckis's solemn two-and-a-half-hour reverie on religion, technology, and the search for extraterrestrial life, has the temerity to imagine such a heaven."

What is perhaps telling here is the order of the elements of the "reverie:" religion, technology, and the search. While it is too late for Carl Sagan to speak for himself, his life work would indicate a list just the other way around, to wit: the search for extraterrestrial life, technology, and, lastly, religion. The heat that has erupted from the film's purported opinions on these issues is astonishing.

Contact is presented openly and honestly as entertainment, not as a graduate thesis. And yet, it may well have done more for the clear public presentation of the realities of science and the integrity of scientists than the century of motion pictures that preceded it.

Stephen Holden, the *New York Times* reviewer, is a considerate and intelligent writer, yet he has apparently seen events that are not indicated by the film itself. In the printed review (but not in the online version), Holden writes: ". . . one of [the aliens] plants a kiss on her cheek, he leaves a blister. . . ." Dr. Arroway does get a bruise on her cheek, but it is from falling onto the floor of the "pod" when it crash lands, not from her "father's kiss." One must question what the problem is here and in a number of other published reviews as well.

Richard Schickel, another fine critic, writes in *Time* magazine: "It [Arroway's final destination in space] turns out to look like a Club Med and to offer reunions with the dear departed, but without any sectarian representation of a deity." "It" appears, in fact, to look like her childhood image of Florida, exactly as she drew it after making her first ham radio contact. This seems to be another fundamental misunderstanding of the basic technological exposition and storytelling of the film.

What is inexplicable about the comments of both of these critics is that the dialog of the film (and in fact the nearly identical material in the book) clearly describe a literal journey through "time and space" to a place that is deliberately created by the aliens from Arroway's memory contents to seem familiar and unthreatening to her: The "aliens" create a vision for her to diminish the inevitable anxiety of traveling to the farthest galaxies and she recognizes it clearly and acknowledges it. The emotional resonance of the scene is in most senses external to, or at the very least grows out of, an attempted portrayal of what a "real" journey might be like.

More fundamental still, but perhaps less obvious, is what might be termed "an irreconcilable difference in the goals of science and art," something, it might be suggested, that forms the actual underpinning of the dramatic conflict in *Contact*.

Imagine a technical specification for an electron microscope that used the phrase *electron source* as the sole description of the portion of the machine that fired particles at the object under

study. What on earth would you order from the hardware store? Now, imagine a piece of music where the conductor announced the name of each and every note before it was played. How long would you listen before you ran out of the concert hall screaming? Screen writers learn to stretch and massage and compress and color facts to make them serve emotional flows, time constraints, and a sort of teeter-totter balance in telling a story: How many facts? How many approximations of facts? How much emotion to glue them together?

Some paleontologists railed against the inaccuracies in *Jurassic Park* and *The Lost World*: dinosaurs that were bigger (or smaller) than fossil remains, or pack behavior in carnivorous dinosaurs that can't be substantiated by either paleontological evidence or study of extant animal behavior. And yet, those movie dinosaurs are emotionally compelling in a way that can't be denied: audiences love them, and more than a small number of high-ranking paleontologists were willing to admit publicly that they do too.

Perhaps the underlying problem in both the real world and the movies is finding a legitimate place for emotion in the process of scientific discovery. Shouting "Eureka!" is not, in and of itself, a scientific discovery, and yet it is (or should be) part and parcel of the discovery. After all, aren't scientists allowed to be excited too?

Contact, in many respects, is about experiencing and dealing with the emotion of "awe." Not just wonder, mind you, but true awe. In the story, the "opposing" protagonists each have an experience of extraordinary emotion: Palmer Joss (a character expanded extensively from the original in the novel) all too willingly relates a personal experience of awe to his rather conventional religious beliefs and interprets it as a proof of God. Ellie Arroway, on the other hand, struggles to relate the awe of her (we assume) literal interstellar experience to some universally agreed-upon, predetermined or empirically determinable set of data and ultimately fails. It is a rather simple and elementary dramatic device of the story that this comes about through her memories of the love of her father, but it would be frivolous to dismiss the underlying issue simply for that reason. She has an experience. She believes she had the experience. She remembers having the experience. But she can't prove it.

In the final scene, Dr. Arroway is grilled by a Congressional committee:

A SENATOR: You come to us with no evidence, no record, no artifacts. Only a story that, to put it mildly, strains credibility. . . . Are you really going to sit there and tell us that we should just take this all on faith?
ARROWAY: Is it possible that it didn't happen? Yes. . . . As a scientist I must concede that. I must volunteer that.
SENATOR: Then why don't you simply withdraw your testimony and admit that this journey to the center of the galaxy, in fact, never took place?
ARROWAY: Because I can't. I had an experience. I can't prove it. I can't just explain it. But everything that I know as a human being, everything that I am tells me that it was real. I was given something wonderful, something that changed me forever: a vision of the universe that tells us undeniably how tiny and insignificant and how rare and precious we all are. A vision that tells us that we belong to something that is greater than ourselves, that we are not—that none of us is alone. I wish I could share that emotion, that everyone, if even for one moment, could feel that awe and humility and that hope that I felt, but . . . that continues to be my wish.

Penn Jillette, a fine magician and devoted, witty skeptic, wrote in his August 8 *Penn Central* column on the World Wide Web, "The end of *Contact* asserted that belief in something tangible by a single person is equivalent to belief in God, and that the reality imagined by saints is the same as scientists understanding something they can't explain to lay people."

I'm not sure exactly which lines he interprets that way, but perhaps it is the part about belonging to something greater than ourselves. In the context of the entire story, that "something greater" is not only the vast size of the universe, but also the fact that even the aliens who bring Arroway out into the galaxies have no idea who designed the machine or exactly why. In the book, Sagan uses the image of a palimpsest—a piece of parchment that, in medieval times, was erased and used again and again—to stand for the infinite regression of the universe. Frankly, the mind boggles at the contemplation of such hugeness. From the evidence of the film itself, there is little reason to believe that the filmmakers are doing more than portraying clearly a scientist's "take" on a personal experience of infinity.

The last statement about "faith" occurs as Arroway and Joss leave the hearings. Pressed by the crowd for an answer to whether he believes Arroway's story, Joss answers, "As a person of faith I'm bound by a different covenant than Dr. Arroway, but our goal is one and the same: the pursuit of truth. I, for one, believe her."

The word *pursuit* is telling. Is Joss maintaining that privately he ever found anything absolute or factual? It doesn't seem so. He appears to be saying, however, that Dr. Arroway did. He and she hold hands in affirmation for only a moment, and we never see him again in the film. Love, apparently, has not triumphed after all, and he doesn't carry her off into the sunset. Genuine respect and friendship seems a more apt description: a stunning slap in the face to the modern convention of carnal consummation as the true high-water mark of a loving relationship. Is this why so many viewers found the movie "cold?"

Arroway's final line in the film is to a group of children she is showing around an array of huge radio telescopes while answering a question about whether there is other life out in space. Her answer basically is that she doesn't know. "The most important thing is that you all keep searching for your own answers," she says to the kids. "I'll tell you one thing about the universe, though. The universe is a pretty big place. It's bigger than anything that anyone has ever dreamed of before. So if it's just us, it seems like an awful waste of space."

In a time of frightening public disenchantment with what everyday people believe to be science, emotions are an important component of what the average person feels is missing

from scientific thought and perhaps the entire scientific "milieu," for want of a better term.

Is there such a thing as a "scientific" personality? I know two professional writers who definitely think so.

Roy Frumkes, a commercially successful screenwriter (*The Substitute*), told me he was annoyed at how cold and emotionless Jodie Foster's character was. A good character, he felt, would have been much more enthusiastic, excited, involving. And yet, in a conversation the very next day, Samuel Delaney, a noted science fiction writer, remarked to me that he was outraged at how excited and emotional the very same character was! No real scientist, he told me, would ever get so excited that she'd hop in her car and drive off barking orders over a radio. She'd sit quietly and check and double-check everything. Perhaps this epitomizes the problem of drama and science coexisting.

How can science quantify or even include "emotion" in its work, and should, in fact, a dramatic motion picture be responsible for sticking to the rules of documentary filmmaking? The *New York Times*, subsequent to the inexplicable review mentioned earlier, interviewed a group of scientists working in the organizations that succeeded SETI. All of them were genuinely impressed with Zemeckis's attention to detail and accuracy, and Zemeckis himself was the first to admit that the scene with Arroway hearing the "signal" while she sat out on the hood of her car was added for dramatic purposes. A real scientist would have been sitting in a claustrophobic little room waiting for a computer to discern minute changes in signals. No headsets. No sunsets. No cellular phones. No huge antennas swinging into position as car wheels kick up desert dust.

Contact is presented openly and honestly as entertainment, not as a graduate thesis. And yet, it may well have done more for the clear public presentation of the realities of science and the integrity of scientists than the century of motion pictures that preceded it.

There is a problem reminiscent of the issue of "expert witnesses." Modern trials are plagued by testimony from individuals who may or may not have the proper qualifications to objectively view an event: "memory" issues and multiple personality disorders, even polygraph tests, leap to mind. Should we expect all film critics, or audiences for that matter, to have expertise in science? Andrew Sarris, then film critic for *The Village Voice*, dismissed *2001: A Space Odyssey* as a piece of paid NASA propaganda. He later admitted in private that he simply didn't like science fiction movies.

What is it about science in movies that invites self-assured scientific commentary from individuals who have no apparent background in science? There is not a simple answer to all this, but I suspect that a little consciousness raising is in order. *Contact* offers us something approaching a portrait of a real-life scientist in a real-life setting: only the events of the ending of the film are totally imaginary, but even those are based upon a rational and even reasonable scenario.

All in all, however, there is no reason to believe that the popular prejudices and confusions about science and technology and "New Age thought" don't apply equally to movies and real life. The pre-millennium rise in pseudoscientific assertions creates a climate in which a thoughtful motion picture will be judged as harshly and negatively as a thoughtful attack on quack medicine. *The New York Press*, an often sagacious independent newspaper distributed in Manhattan, actually published a set of articles by five correspondents who trashed *Contact* outright for the most outrageous and salacious reasons, as though there was an open season on intelligence in film.

Surely, we need some sense of wonder in our lives. For an educated audience, *Contact* may, in many respects, be a step down in the contemplation of the magnificence of the unexplored galaxies, but for general audiences it is a step up. I've seen it twice now: once in a suburban theatre and once in a theatre in Manhattan. In both cases, the audience was transfixed and clearly rooting for the heroine at every moment—despite the fact that she is a self-proclaimed, agnostic scientist from start to finish. The suburban showing ended with applause, and more than one third of the audience sat to watch all of the credits. At the New York City showing, however, a puzzled young man burst out in the moving silence at the end of the film with a scatological question about who "Carl" was. This was greeted with universal laughter.

Never in my recollection has there been such an uncompromising motion picture portrayal of a moral, ethical, unswerving practitioner of the scientific method.

I've noticed over the years that films like *2001* and *Brazil*, and now *Contact*, make certain people a little uncomfortable. Anything that causes us to involuntarily question our assumptions can be somewhat unsettling, and a crowd of teenagers who managed to sit still through a serious and provocative two-and-a-half-hour motion picture will now undoubtedly think about the scheme of things a little bit differently.

For those who don't believe in ghosts or time travel, I offer one more thought. Carl Sagan has reached out from beyond the grave. Those words he scribed twelve years ago have traveled well through the years, and it is a shame he can't be here to see this respectful portrayal of his vision on the screen. It is a fine thing that this popularized version of a thoughtful and serious book will be available on screen and video to travel down through a few more years, until, perhaps, some version of the "reel" events becomes real. And it is startlingly appropriate that the film was released within days of the thrilling Mars landing and the emotional last-minute decision to name the probe after Sagan.

Thank you, Robert Zemeckis, and your vast crew, for taking care of your science homework and for resisting overkill. Thank you, Jodie Foster, for breathing life into what could have been a dull, dry disaster. And thank you, Carl, for dreaming this dream for us all, especially those of us who don't fully comprehend or appreciate it yet. Albert Einstein, who once wrote, "I maintain that the cosmic religious feeling is the strongest and noblest motive for scientific research," would have approved. □

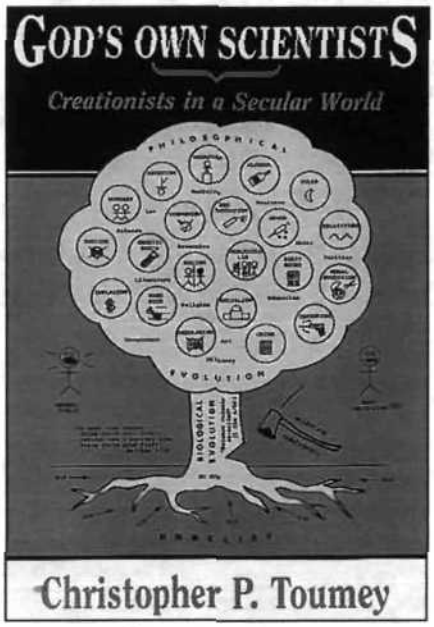
In Creation Science, Evolution Causes Immorality

ROBERT A. BAKER

God's Own Scientists: Creationists in a Secular World. By Christopher P. Toumey. Rutgers University Press, New Brunswick, New Jersey. 1994. 289 pp. Softcover, $15.

Christopher Toumey, a cultural anthropologist, has performed an invaluable service for all those interested in modern creationism and the assorted delusions of the creationist movement. Looking at the creationists and their belief system from the viewpoint of a scientist studying the habits of a tree-worshipping tribe in the hills of New Guinea, Toumey spent more than five years talking with creationists, attending their lectures, visiting their study and prayer groups, reading their literature, and interviewing their leaders. The result is a comprehensive, detailed, and incisive study of what makes modern creationism and its advocates tick.

Although Toumey's research was restricted principally to the *Americanus creationin north carolinum* during the 1981–1985 period, there is little doubt that his findings are generalizable to creationists and creationism everywhere. Toumey's research methods included: 1) a series of structured interviews with fifty-one creationist activists in North Carolina; 2) interviews with national creationist leaders in California and elsewhere; 3) interviews with local politicians, scientists, educators, and religious figures in North Carolina; 4) participant-observation with a local creationist study group; and 5) participant-observation at other creationist venues and religious services in North Carolina.



In working with the creationists, Toumey let it be known from the outset that he was not a creationist (but a Roman Catholic) and that he sincerely disagreed with much of what they professed. He also informed them that he was distressed over their being so badly misunderstood and misrepresented by journalists and evolutionists. He also told them that the purpose of his research was:

> to explore the social and cultural side of scientific creationism, i.e., the kinds of people who support the creationist argument, and why they feel the way they do about it. . . . It is a search for an honest and accurate description of the movement, which will replace or correct the usual stereotypes of its members and the simplistic clichés about their beliefs.

Not only did this honest approach meet with the creationists' approval, it proved to be so effective that the creationists invited Toumey to their meetings and made him a member of the local creationist study group. Moreover, they saw to it that Toumey was included in all meetings, gatherings, and creationist activities during the five-year period. Toumey reports, "I also became, by default, the group's unofficial historian of creationism," adding that he attended more creationist venues than even the most avid and ardent creationists.

Other than being told by one interviewee that, because he was a Catholic, he would go to hell, all of the other activists and conservative Christians were exceedingly friendly, gracious, and generous, Toumey reports, and provided all of the information—both personal and otherwise—that he requested.

Toumey's work makes crystal clear that modern creationist belief is much more subtle and complex than is commonly thought. The usual assumption that creationists are a bunch of Bible-thumping, scientifically illiterate ignoramuses is badly amiss. Modern creationists like Henry Morris, Duane Gish, and

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others claim that *the authority of modern science resides with creationism, not evolution.* Supporters of evolution have seen creationists "come forth with some scientific credentials, some select definitions of science, and a remarkably strong body of public opinion concurring with their claims to scientific status."

Toumey stresses that creationism, as a belief system, "helps fundamentalist Christians make sense of the realities, anxieties, changes, and uncertainties of life in the United States in the late twentieth century." Soothingly, creationism contends that there is little conflict between the Holy Bible and science and that, actually, science is on the side of the Bible, in opposition to the idea of evolution. Creationists contend that evolution is the cause of—or at least it is intimately involved in—the moral disintegration of life in the United States today. This strange conviction is summarized in a drawing known as the Evolution Tree. Created by engineer Richard G. Elmendorf, a dedicated creationist, it shows twenty-one sins or "evil fruits" growing from the "trunk" of evolution. Among the fruits are abortion, homosexuality, drugs, dirty books, racism, communism, terrorism, crime, secularism, cults, alcohol, suicide, and inflation. All these, Elmendorf believes, can be destroyed if we destroy evolution.

Toumey notes that creationists seek the endorsement of science because of science's plenary authority; in other words, creationism becomes more credible and more valuable if it is also thought to be *scientific.* He discusses at length the complex social relationships and conflicts that exist between the various types of creationists and, in the third part of his book, describes in detail the history of religion and politics in North Carolina during the 1980s and the struggle to implant creationist thought in the public schools. Toumey also provides a history of the creationist movement and conservative Christian belief from the early 1960s through the 1980s.

Toumey devotes a chapter to outlining the beliefs of the New Religious Right and their moral interpretation of evolution. Included here are some illuminating stories about the Reverend Jerry Falwell and Liberty University, Lane Lester of the Center for Creationist Studies, Henry Morris and the Institute for Creation Research, and the Reverend Tim La Haye and his Christian Heritage College, as well as Inerrancy Baptists, the Evangelical Center, Apocalyptic Separatists, Jehovah's Witnesses, and others holding a wide variety of beliefs. All these proponents of the Religious Right are convinced that there is a conspiracy afoot known as secular humanism that is solely responsible for the evil and immorality that permeate the modern world. Righters also adamantly believe that modern science corroborates the literal, historical authenticity of the narratives in Genesis—even though there are multiple interpretations of science's role and authority among the various creationist groups (e.g., the Bible Science Association, the Geoscience Research Institute, and the Institute For Creationist Research).

In a fascinating chapter titled "Inertia and Centrifuge: The Paradox of Sectarian Support," we are as surprised as Toumey was to discover that conservative Christians have been singularly unsuccessful in pushing the argument that scientific authority supports the creationist view. In Toumey's words:

> The more adamantly the conservative Christian organizations insisted that evolutionary thinking was immoral, the more the rest of the North Carolina population distrusted the creationist agenda for science education. In their attempts to take creationism into the secular world, many of its proponents simply did not and do not have the appropriate and necessary political skills. . . .When the creationist movement concerned itself with contentious religious topics, its message alienated people who were not conservative Christians; but if it masked its spiritual meaning for the sake of secular credibility, then it betrayed its own soul.

One of the most delightful sections of the book deals with Toumey's adventures as a member of a creationist study group. Here Toumey's anthropological talents come into their own. The con-

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versational by-play and arguments, and the exposures of naiveté, educational ignorance, stupidity, paranoia, and conflicts of religious bias and belief make for high entertainment. A related chapter concerns a number of reputable scientists and engineers who claim they find no conflict between their scientific habits and their creationist beliefs. Just how good their science is and how deep and broad their scientific training may be is moot.

Although many skeptics have taken the creationists to task and catalogued their errors and deficiencies, Toumey is one of the first to call attention to the creationists' belief that what they are doing is "true science" and what the rest of us are doing is not. Toumey shows us how easily our strongest weapons against ignorance and superstition can be coopted and turned against us. For most of us, the mere idea that evolution causes immorality is so outlandish and inane that it would be dismissed immediately. To recognize and realize that hundreds of our fellow citizens take the issue most seriously and believe that evolution does, indeed, breed all that is evil is not only downright scary but should, if we seriously care about our collective future, stir us to action. □

Dinosaur Movie Science

TERENCE HINES

The Science of Jurassic Park and The Lost World, or How to Build a Dinosaur. By Rob DeSalle and David Lindley. Basic Books, New York. 1997. ISBN 0-465-07379-4. 194 pp. Hardcover, $18.

The film *The Lost World* and its predecessor, *Jurassic Park*, have fueled a great interest among the general public in dinosaurs. Of particular interest is whether it would really be possible to reconstruct a dinosaur from tiny bits of dinosaur DNA found in a blood-sucking insect trapped in amber just after it had fed on dinosaur blood. The few discussions of this question that appeared in the popular press following the opening of *Jurassic Park* did not give an adequate answer. Now, happily, this book has appeared, and readers interested in this important and fascinating question will find a most entertaining answer.

This is by no means a debunking book. It does not demean either of the two films. Rather, the authors discuss the molecular biology, ecology, and mathematics of the claims made, either explicitly by characters in the films, or implicitly by the films' plot lines. Given the nature of these films, by far the largest part of the book concerns the molecular biology of dinosaur reconstruction. The reader is led step by step through the processes and procedures that would have to take place to create dinosaurs and their original environment. Also discussed are the problems one would face in the care and feeding of baby and adult dinosaurs and in maintaining the realistic ecosystems that would be required to support the numerous species of dinosaurs shown in the films.

The problems are truly daunting. Unfortunately, for those of us who would love to see living dinosaurs, it appears to be virtually impossible that sufficient DNA could be extracted from a blood-sucking insect to recreate a dinosaur genome. Undiscouraged, the authors consider whether such a reconstruction would be possible if an actual chunk of dinosaur flesh, perhaps tossed into tree sap during a fight, were to be preserved in amber and later recovered. But even here, the chances seem vanishingly small for successful reconstruction of the genome.

The authors further point out that even if the complete dinosaur genome could be reconstructed, this would not guarantee that one could create a living dinosaur. The genome would have to be put into an egg for development. Without a dinosaur egg into which one would place the dinosaur genome, the genome would probably not develop normally, if at all. But the only way to to get a dinosaur egg is to recreate a dinosaur in the first place! This poses rather a problem for any would-be dinosaur reconstruction project.

DeSalle and Lindley go into some detail about the molecular biology that would be used in the genome reconstruction. Their explanations of difficult topics in molecular biology are very clear and readable. In fact, their explanation of the basics of the polymerase chain reaction (PCR) is the clearest I've ever read. The book is intended for the nontechnical reader and is happily free of off-putting scientific jargon. In addition, the authors have a good sense of humor and let the reader in on a couple of features of the books and films that would otherwise go totally unnoticed. For example, in the book *The Lost World*, one of the characters finds a memo that gives the sequence of bases, the building blocks of amino acids, that corresponds to a particular protein. When the authors translated the base sequence into the corresponding amino acid sequence, they found there were fourteen amino acids in the sequence that do not exist in the protein in question. When the first letters of these fourteen extra amino acids were arranged in sequence, they spelled out "MARK WAS HERE NIH." You'll have to read the book to find out who Mark was and why his name turned up where it did.

The book also considers the ecology of a place like Jurassic Park. It turns out that the small island shown in the film is much, much too small to support anything like the dinosaur populations shown. In fact, it would take an area about the size of Connecticut to support

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the number of animals shown in the films.

The mathematical pontifications of the character Ian Malcolm, the supposed expert on chaos theory, also come in for careful consideration. Whereas the molecular biology shown in the films doesn't actually misrepresent the nature of that field, Malcolm's alleged mathematics is simply nonsense. The script writers obviously took some care to get the basics of their molecular biology right but did not exercise any such care when it came to chaos theory.

This book will be a fun read for anyone interested in the issues raised by these films. It would also make an excellent adjunct reading in an advanced high school or introductory college biology course. □

A Gripping Story of Quackery and Death

TERENCE HINES

Starvation Heights. By Gregg Olsen. Warner Books, New York. 1997. ISBN 0-446-60341-4. 416 pp. Paperback, $6.50.

The genres of serial killer/true crime and skeptical investigation do not often overlap. But they do so, and very well, in this riveting story of medical murder and quackery set in beautiful Puget Sound in the early 1900s. Linda Burfield Hazzard, at the time the only licensed "fasting therapist" in the country, set up a sanitarium in the tiny town of Olalla, Washington, in 1911. As readers of this journal will be aware, one sure sign of a quack treatment is the claim that the treatment will be effective for a wide range of different disorders. Sure enough, Linda Hazzard claimed that her particular brand of fasting would cure everything from epilepsy to lead poisoning. A sure sign of a quack diet is the claim that the diet will "purify" the body by aiding the removal of various unspecified "toxins." True to form, the rationale for the fasting cure was to allow the body time to rid itself of just such toxins.

Had Hazzard simply advised her patients to fast for a few days, little would have come of her treatments, for better or worse. However, her regimen was much more bizarre and dangerous. She had patients fast for up to thirty days, allowing them only the slightest amount of very thin tomato soup. Combined with fasting, patients were given "massages" that more closely resembled beatings. To make matters worse, at least some of Hazzard's victims were persuaded, while in their greatly weakened state, to give her power of attorney and to change their wills in her favor. Valuables left in Hazzard's care were very likely to disappear.

It will come as no surprise that a number of patients died under the horrific treatments handed out by Linda Hazzard. The exact number is not known, but it is certainly more than ten—perhaps a lot more.

The horrors of "Starvation Heights," as the sanitarium was known to local residents, might never have become known to the world had it not been for two unfortunate English sisters, Claire and Dora Williamson, who came under Hazzard's care in 1911. These rich, orphaned young women spent their time traveling the world, frequently checking out the latest natural cure. From Olsen's description, one gets the impression of these sisters as naive and somewhat hypocondriacal health faddists.

While under Hazzard's care, Claire starved to death. Dora survived. The story of their fate, and Dora's last-minute rescue from Hazzard by a dear and loyal former nanny who had come all the way from Australia in response to a cabled plea from Claire shortly before she died, is as suspenseful and heart-wrenching as anything I have read in horror fiction. Following her rescue, Dora recovered and became determined to see her sister's death avenged and Hazzard brought to justice. The local authorities were not at all keen on doing this. It required the heroic efforts of the British Vice Consul in Tacoma, Washington, Lucien Agassiz, and several others, to see that Hazzard was finally brought to trial in 1912. The trial attracted worldwide attention. Olsen provides a gripping description of that trial. I will not reveal the outcome, other than to say that it was not the end of Hazzard.

Olsen's telling of this long-forgotten story is first rate. My only quibbles are that he tends to jump around a bit in the narrative and he doesn't give the reader any information about what finally happened to several of the major players in the story. Linda Hazzard's history following her trial is told in detail. But the fate of Dora Williamson, about whom I came to care a great deal, is unrevealed. She simply vanishes. Agassiz and the nanny, Margaret Conway, similarly vanish once the trial, but not the book, is finished.

Finally, some readers may be troubled by the author's use of a standard technique in true-crime writing—the reconstruction of conversations between characters that were certainly never recorded verbatim. It is an effective means to heighten the drama of the story, but the use of quotation marks in this context should be taken with a large grain of salt. Nonetheless, the author's notes make it clear that he has relied very heavily on primary sources (court transcripts, official records, etc.) for the factual material in this book.

Starvation Heights is an excellent cautionary tale about the dangers of health quackery that is most relevant today, even though it concerns events that took place over eighty years ago. □

NEW BOOKS

Parapsychology: A Concise History. **John Beloff.** St. Martin's Press, 175 Fifth Avenue, New York, NY 10010. 1997. ISBN 0-312-17376-8. 330 pp. Softcover, $18.95. First softcover printing of author's history of parapsychology, first published in the U.S. in 1993. In our Spring 1994 issue we said, "Probably of most interest is the second half of the book, which deals with modern developments beginning with experimental parapsychology and Rhine's Duke experiments through the remote-viewing experiments of the 1970s and the ganzfeld experiments of the 1980s and 1990s. Beloff's point of view is that of someone who wants to find evidence of psi but who realizes most claims fall short of demonstrating it."

Smiling Through Tears. **Pamela Freyd and Eleanor Goldstein.** Upton Books, P.O. Box 2348, Boca Raton, FL 33427. 1997. ISBN 0-89777-125-7. 131 pp. Softcover, $14.95. Handsome book uses 130 satirical cartoons (Calvin and Hobbes, Doonesbury, Feiffer, Hagar the Horrible, Beetle Baily, Shoe, Non Sequitur, Dilbert, and many others) to help lead the way through the major ideas behind the recovered memory/false memory controversy. In their text, the authors, respectively the founder of the False Memory Syndrome Foundation and the author of *Confabulations* and *True Stories of False Memories*, describe the techniques that have been used to create false memories of childhood sexual abuse and subsequent accusations.

UFO Crash at Roswell: The Genesis of a Modern American Myth. **Benson Saler, Charles A. Ziegler, and Charles B. Moore.** Smithsonian Institution Press, 470 L'Enfant Plaza, Suite 7100, Washington, DC 20560. *1997. ISBN 1-56098-751-0. 198* pp. Hardcover, $24.95. The first scholarly book about the Roswell incident that treats it is a modern myth. The first two authors are anthropology professors at Brandeis University; the third is the atmospheric scientist whose 1947 balloon-research experiments produced the debris found on the Foster ranch that was the original stimulus for the Roswell story. After a summer that saw a frenzy of mostly uncritical popular and media interest in the fiftieth anniversary of the Roswell event, it is refreshing to find a thorough and clear exposition of the Roswell-as-myth theme. In this regard, it falls in the tradition of Jung, Donald Menzel, and Curtis Peebles (whose 1994 book *Watch the Skies* dealt with the mythological aspects of the entire UFO movement). The book includes chapters on Mythogenesis: Historical Development of the Roswell Narratives, Analysis of the Roswell Myth, the Early New York University Balloon Flights, Roswell and Religion, and Three Images of Roswell (the public image, the scholarly image, and the believers' image). This last chapter also deals with the link between Roswell and the media and what it all portends for the future. Moore's chapter on the NYU balloon flights gives extensive additional detail, documentation, and graphics beyond what we published in *SI* (July/August 1995). As did Peebles for the UFO movement generally, the authors say the Roswell incident has little to teach us about extraterrestrial beings but much to tell us about ourselves and the society in which we live.

— *Kendrick Frazier*

ARTICLES OF NOTE

Anderson, Kurt. "The Origin of Alien Species." *The New Yorker*, July 14, 1997, pp. 38–39. Author's "preliminary taxonomy" decides that Hollywood aliens may be grouped into six distinct types of space creatures. The "evolutionary pseudobiology" of movie aliens is constrained by a limited range of modes and materials. For this reason, one producer says, "They all look similar."

Annon, Jack S. "Psychologists Who Make Unqualified Public Statements About Litigants Whom They Have Not Examined: A Cautionary Note." *Issues in Child Abuse Accusations* 8 (3/4): 170–173. Warns that psychologists who provide expert testimony in court without properly qualifying their opinions may be violating ethical codes and specialty guidelines.

Bartholomew, Robert E., and Francois Sirois. "Epidemic Hysteria in Schools: An International and Historical Overview." *Educational Studies* 22 (3): 285–311. 1996. Report of a study examining the characteristic features of epidemic hysteria reports in school settings. Identifies three distinct symptom patterns: "mass motor hysteria" (traditionally in non-Western settings); "mass anxiety hysteria," typified by the sudden appearance of extreme anxiety following the redefinition of a mundane event such as illness in a fellow student or an unfamiliar odor; and "mass pseudo-hysteria," which involves the relabeling of "mundane symptoms by hypervigilant authorities." Discusses the diagnosis (starting with noting the absence of a concrete pathogenic etiology) and management of epidemic hysteria.

Bernet, William. "Case Study: Allegations of Abuse Created in a Single Interview." *Journal of American Academy of Child Adolescent Psychiatry* 36 (7): 966–970. July 1997. The goal of this study was to illustrate how young children can be induced to make false allegations of sexual abuse. In this unusual case—in which the interviewer was a babysitter rather than a mental health professional—elaborate, detailed allegations of sexual abuse came about during a single, tape-recorded interview. The study finds that children can be induced to make elaborate and detailed false statements after being subjected to repetitive, suggestive, and misleading questions during a single interview.

Bernet, William, and David K. Chang. "The Differential Diagnosis of Ritual Abuse Allegations." *Journal of Forensic Science* 42 (1): 32–38. 1997. Because psychiatrists do not have a consistent way to classify and define the forms of child abuse that may be mistaken for ritual abuse, the authors set out to create a comprehensive differential diagnosis of allegations of ritual abuse.

Burr, Chandler. "The Geophysics of God." *U.S. News & World Report*, June 16, 1997, pp. 55–58. Detailed article about John Baumgardner, a Ph.D. geophysicist at Los Alamos National Laboratory, acknowledged world expert in geophysical convection, and a fundamentalist Christian who believes that the Earth was created by God less than 10,000 years ago. According to the article, Baumgardner created the Terra computer program at Los Alamos "expressly to prove that the story of Noah and the flood of Genesis . . . happened exactly as the Bible said." If true, this in itself should raise serious questions, but the author devotes three pages to Baumgardner's views and efforts to demonstrate "runaway subduction," which the scientist says could have created a giant global flood, before acknowledging on the last page that "among geologists, there is universal agreement that Baumgardner's views are simply wrong." Another Baumgardner contention, rapid radiometric decay, "is not

impossible," says the author. "It just contradicts almost every existing piece of evidence."

Deutsch, Sid, and George M. Wilkening. "Electromagnetic Field Cancer Scares." *Health Physics* 73 (2): 301–309. August 1997. Article examines the science of low-frequency electromagnetic fields, the allowable standards, and epidemiology studies. Concludes that "it is highly unlikely that there is a link between electromagnetic fields and cancer."

Evans, William. "Divining the Social Order: Class, Gender, and Magazine Astrology Columns." *Journalism and Mass Communication Quarterly* 72 (2): 389–400. Summer 1996. A study of magazine horoscopes shows that the financial level of the expected audience is a better predictor of the advice than the astrological sign of the recipient. For example, travel plans are predicted for middle class readers more often than for working class readers.

Gottfried, Kurt, and Kenneth G. Wilson. "Science as a Cultural Construct." *Nature* 386: 545–547. April 10, 1997. Two prominent scientists critically examine the thesis, put forth by what they call the "Edinburgh" school of sociology, that scientific knowledge is a cultural construct and has a dubious grip on reality. These sociologists fail to distinguish between "science-as-practice" and "science-as-knowledge," creating a "muddle," say the authors. They urge the school to revisit its underlying assumptions.

Greene, Mott T. "What Cannot Be Said About Science." *Nature* 388: 619–620. August 14, 1997. Commentary by historian of science decries the fact that the scientific enterprise is full of experts on specialized areas but woefully short of people with a unified worldview. Specialization is absolutely necessary, Greene realizes, but it is not all of science: "generalization and synthesis are parts of it as well." Both have been de-emphasized and even actively discouraged for decades. "So today's scientists are in command of only a small part of what is known. . . . If this trend continues, one can imagine a world dominated by the results and artifacts of natural science, but in which no one has a scientific worldview."

Hazen, Robert M. "What We Don't Know: The Unanswered Questions of Science." *Technology Review*, July 1997, pp. 23–30. Some critics claim that all the great questions in science have already been answered or are simply unanswerable. But a leading defender says such "facile" claims ignore the nature of the scientific process and the character of the questions it attempts to answer. He writes of what we don't know ("inherently unlimited in scope") and provides a list of fourteen "compelling questions that fascinate today's scientists and drive their research."

Jacobson, John W., et al. "A History of Facilitated Communication." *American Psychologist* 50 (9): 750–765. September 1995. A lengthy review and analysis of the literature concerning facilitated communication. It concludes that FC is basically a fad, with strong similarities to "pseudoscience."

Loftus, Elizabeth F. "Creating False Memories." *Scientific American*, September 1997, pp. 71–75. Major, accessible overview, by psychologist and expert on memory and eyewitness testimony, of laboratory experiments that show persuasively that suggestion and imagination can create "memories" of events that did not occur. Mental health professionals and others "must be aware of how greatly they can influence the recollection of events," Loftus concludes, and maintain restraint in situations "in which imagination is used as an aid in recovering presumably lost memories."

Ortega, Tony. "The Great UFO Cover-up." *Phoenix New Times*, June 26 to July 2, 1997. Hundreds of people reported a dramatic V-shape of five lights passing over Phoenix the night of March 13, 1997. The lights created a frenzy of speculation and news coverage. But it happens a witness, a twenty-one-year-old amateur astronomer named Mitch Stanley, briefly turned his ten-inch telescope on the lights that night and saw what they were: "planes." The lights were on the undersides of squarish wings, Stanley says, and the planes themselves seemed small, like light private planes. "They were just planes," he said, and after looking at them for a minute, turned his telescope to the stars, not thinking another thing about them until the next day when hundreds of reports of UFO sightings made the news. Despite his clear sighting, Ortega says, the media and others, when told of it, were not interested in anything so mundane.

Park, Robert L. "How Strange Is the Universe?" *U.S. News & World Report*, August 18/August 25, 1997, pp. 83–85. Quantum mechanics and relativity, the two great revelations of twentieth-century physics, introduced ideas that seemed outlandish, even preposterous, Park notes, and gurus and writers have popularized that notion. Yet what is too little realized, he says, is that "both have made the universe more explicable and predictable than it ever was before." Relativity replaced Newton's mysterious notion of "action at a distance" with the curvature of space-time, which resolved several paradoxes and "is really not a very strange idea at all." The Heisenberg uncertainty principle is often mistakenly taken to mean that the universe is unpredictable. Says Park: "Just the opposite is true: The uncertainty principle is actually a recipe for making measurements with incredible accuracy." This invited essay is part of a well-done, fifty-four-page, sixteen-piece special report on the great mysteries of science.

Rilling, Mark. "The Mystery of the Vanished Citations." *American Psychologist* 51 (6): 589–598. June 1996. James McConnell was a pioneer of neuropsychology whose research sometimes approached fringe territory. He was also one of the first modern celebrity-scientists, which may be the reason he was (unsuccessfully) targeted by the Unabomber. Rilling says that McConnell has disappeared from the scientific literature through "citation amnesia"—his pioneer work is not being mentioned in footnotes and bibliographies.

Scott, Eugenie C. "Antievolution and Creationism in the United States." *Annual Reviews of Anthropology* 26: 263–89. 1997. Important, comprehensive review of the issues surrounding opposition to the one well-accepted scientific theory that is rejected by nonscientists. Religious opposition to evolution propels antievolutionism, which has a long history in America. Anthropologist Scott, director of the National Center for Science Education, defines the terms and issues critical to understanding the creationism movement, presents the continuum of antievolution positions, and discusses the history, motivations, and evolution of antievolutionism. She argues that antievolutionism has evolved from the purely religious opposition of the Scopes era to creation science and then to the present "neocreationism" period. The latter involved the movement of antievolutionism to secular schools of higher learning. Although rejected by scientists, intelligent design arguments and publications are appearing at the college level in nonscience courses, presented as accurate representations of scientific scholarship.

Wojcik, Daniel. "Polaroids from Heaven: Photography, Folk Religion, and the Miraculous Image Tradition at the Marian Apparition Site." *Journal of American Folklore* 109 (432): 129–148. Spring 1996. For more than twenty years Catholics have visited a site in Queens, New York, where the Virgin Mary is allegedly seen. They take photographs at night there and interpret the blurry results as divine images. Wojcik traces the "supernatuaral photography" traditions back to the 1860s.

— *Kendrick Frazier*
and *Robert Lopresti*

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Disturbing Circles

RALPH ESTLING

Everyone (well, very nearly everyone) thinks that the reason Copernicus refused to publish his book about the heliocentric system until he was dying was that he feared the Church wouldn't like it. Very nearly everyone is wrong. Copernicus held back because he knew that his scientific colleagues wouldn't like it, and would have good reason not to. The calculations Copernicus made on where the planets should be in their paths around the sun were no better, and in many cases were worse than, what had been determined with the old, creaking geocentric system of Ptolemy. This because, while Ptolemy's preconceptions harked back to Aristotle, Copernicus's preconceptions went back a generation further, to Plato.

Plato is responsible for confusing more people about more things through more time than anyone else who has ever lived. One thing he confused people about was circles. He decided that the circle was the perfect geometric figure and, therefore, any number of things must follow. Two millennia later Copernicus, following this Platonic preconception, decided that the orbits of planets around the sun must be circles with the sun at their center, a kind of celestial bull's eye. For, how could it be otherwise? God, being perfect, created the universe in a state of perfection; the circle is geometric perfection; *ergo,* the planets must move in circles around a motionless sun that stands at the precise center of these circles. What could be simpler, more perfect, more God-created? The only trouble was that Copernicus's own observations of the planets made a cock-up of the whole idea.

Copernicus, supposedly a man of the Renaissance, a man brimming with revolutionary concepts about the way things were in the heavens, had preconceptions that proved him to be medieval, a mystic, a worshipper of perfect this and ideal that. The reason Earth and the other planets went round the sun, he construed, was that the sun was the majestic symbol of God. Problem solved.

The man who proved Copernicus right about heliocentricity and wrong about circular orbits was another person we think of as possessing an enlightened soul. But Kepler worked as an astrologer, had a preconception that the five regular polyhedra were somehow instrumental in determining the distance of the planets from the sun, and believed that the Music of the Spheres was a real tune, one you could hear, if you listened hard enough and in the right way. When he wasn't putting his mind to things like these, he was observing the sky. He eventually realized that the planets revolved in ellipses, not circles, with the sun at one focus, not the center. He didn't know why this should be so, but his observations, based on the data of his patron, Tycho Brahe, proved this beyond a shadow of a preconceptual doubt. Chalk one up for observation over hypothesis.

In due course, Kepler became an admirer of Galileo, but the admiration was not reciprocated. The thing was, Galileo admired Copernicus and perfect circular orbits with the sun at their center. *That,* Galileo was certain, is how things ought to be. Organized. Simple. Perfect. And so he did not move. Kepler's mishmashy huggermugger of a so-called system infuriated the artist in Galileo, and so, like the fine, totally rational, completely objective thinker that he was, Galileo ignored the whole thing. It was not aesthetic. Not until that most scientific and rational of men, Isaac Newton, who believed in alchemy and secret messages hidden in the Bible, came along was the matter cleared up. It turned out that the universe wasn't a case of God-crafted perfection. It was a case of mechanics.

The problems here were of preconceptions, and how these lead to misconceptions. Unfortunately for simplicity's sake, and nice, neat little summation's sake, the problem doesn't stop there, because without preconceptions, we have no science, no rational concepts at all. (So much for large-print user's manual instructions on logical thinking for

Ralph Estling writes from Ilminster, Somerset, U.K.

beginners.) Hypothesis (which is just a word scientists use when they mean having preconceptions) must precede discovery. We must have preconceptions, notions not based on much except some vague, lingering hunch, before we can even begin to conceive of the truth—or misconceive it. The trick comes, of course, in either getting the right preconception or, having a wrong one, realizing it and dropping it like a hot potato.

Circles are appealing in their simple perfection, and simplicity and perfection are as appealing to scientists as they are to everyone else. It is what they are continually striving to achieve: Organization. Simplicity. Perfection. Of concepts no less than of solutions. This results in elegance. Whether physicist or mathematician, it is elegance that is sought, and worshipped.

But suppose, just suppose, that the universe, at heart, is not as elegant as all that, is not elegant at all! Suppose it's all jerrybuilt and jury-rigged, a kaleidoscope of kludges, its underlying laws Darwinian, pragmatic, patchwork, messy, disorganized, out of joint. What then?

When the Roman soldier who was seeking Archimedes found him, the great scientist was sitting gazing intently at the circles he had drawn in the dirt with a stick. This time Archimedes did not shout "Eureka!" or declare that, given a place to stand, he could move the Earth. He merely muttered to the soldier not to disturb his circles, and the soldier killed him for his insufferable nonchalance. But perhaps the soldier, as well as his spear, had a point. Perhaps our circles, simple, perfect, timeless, and elegant, ought to be disturbed, at least once in a while, our preconceptions probed and poked at every so often . . . just to keep us, and our conceptions, on our toes. What could be more elegant than that? □

PREPOSTERISM

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SEABORG INTERVIEW

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treatment with the same radioactive iodine (iodine-131).

SI: Here we are almost at the end of the century. How has the world changed—in science and technology and in society generally? Are you generally optimistic about the future of U.S. society?

SEABORG: Well, I think I would say "yes." As to how the world has changed, I really have spanned the gap. When I was a little boy in Ishpeming, Michigan, where I spent my first ten years, we didn't have a telephone in the house and I'd never heard the word "radio," let alone seen a radio. And when I first moved to the Los Angeles area, in what is now South Gate, I did learn about the existence of radio and began trying to build crystal sets. Through the years to today, I've watched the developments. Although I've never been interested in biological sciences, probably the big discoveries in the future will be in the biological sciences—the possibility of creating artificial life, the study of the mechanisms of disease, the discovery of chemical agents that can counteract and cure disease, and so forth. I believe the world is much better off—extremely better off—because of the gradual growth of science and its applications. My father's parents died of tuberculosis. That wouldn't be necessary today. There have been tremendous advances in medicine, the curing of diseases of all kinds. We're living in a much better world now than my grandparents did, or my parents. We can travel anywhere in the world, in just a matter of hours. We have a system of communications where we know what's going on all over the world within minutes. We have a much better understanding of nutrition. Many advances in medical science have prolonged life so that the life span has become much longer. All in all, we're living in a much better world than our parents or our grandparents lived in. □

Roswell Revisited

My son found me reading "What *Really* Happened at Roswell" (*SI,* July/August) and raised the question of why people like me get satisfaction from reading debunking articles about paranormal claims such as appear in your excellent magazine. He pointed out that anyone who possesses ordinary common sense cannot be duped by such "silliness," and those who are believers cannot be dissuaded from their belief in nonsense. His observation was reinforced on the *Lehrer News Hour* when a scientist from American University (as I remember) and a writer of "we have been visited by aliens" garbage faced off in a kind of debate. Mr. Lehrer, at one point, asked the writer if anything the scientific community could say would cause him to change his mind. His answer mostly centered around the matter of government coverup. Apparently paranoia is a big component of paranormal.

John Stouffer
Hingham, Mass.

I was bragging to my young son, Sam, about Kal Korff's article in your July/August issue finally laying to rest "what really happened at Roswell." The whippersnapper was quick to point out it may have impressed me because I am not a UFOer, and more particularly because I am not an uncritical accepter of that "bastard science"!

I therefore turned his attention to the News and Comment item by John R. English (same issue) about the "anachronistic 'danger' sign" in "Alien Autopsy" and asked him how a true believer in the idea of alien visitors could claim that the "alien autopsy" film—supposedly filmed in the 1940s—is not a hoax, when it shows a "danger" sign that was not adopted by OSHA until 1967! This was his bland response:

"Everyone who has claimed to see an alien has confirmed that, although they have a 'childlike' appearance, with big innocent eyes and all that, we all know they are far superior to us intellectually and that they have the power to go 'back and forth in time.' These little imps are not without humor, and it would be no great feat for them in 1940 to travel into the future of 1967, pick up the then-current danger sign, and return to 1940 and put it on the autopsy room wall just to befuddle past directors of the International Aerospace Hall of Fame, such as author John R. English, would-be debunker of the alien autopsy."

As my jaw dropped in skeptical amazement, the kid said: "*Just kidding, Pops!*"

Unfortunately, there are doubtless hundreds of UFO "true believers" who would seriously argue such an explanation.

Norman N. Gottlieb
Flint, Mich.

The recent publicity surrounding the Roswell incident in general and Stanton Friedman in particular has led me to write with this addendum that seems to have been overlooked.

In 1979, shortly after Stanton Friedman began his partnership with Major Jesse Marcel, I worked as an assistant editor on a documentary film titled *UFOs ARE REAL.* Without access to the film (I don't believe it's available on video), I can't check my facts, but to the best of my memory, Stanton Friedman was either a cowriter or a major consultant for the film.

UFOs ARE REAL was a survey of ufology of the moment and covered Roswell and many other known incidents, including Betty and Barney Hill, Billy Meyers, and the like. I believe that Stanton Friedman referred to himself as *Dr.* Stanton Friedman and claimed to have been a physicist. Although his job description was not specified, the clear implication was that his position with the space program made him a knowledgeable expert. He demonstrated his expertise as a physicist by claiming that travel to (and thus from) nearby stars would be a simple matter. We could obtain superlight speeds by sequentially exploding atomic devices behind a spacecraft. Naturally, each explosion would accelerate the vehicle until faster-than-light velocity was achieved. Perhaps, when he was studying for his Ph.D., Friedman missed the chapter on relativity.

Another interesting aspect of *UFOs ARE REAL* concerning Roswell is that there were no claims of bodies being recovered. I can't remember whether Marcel claimed that the recovered material was switched by General Ramey, but one interviewee, who said she handled the recovered material as a child, described a lightweight substance completely consistent with Mylar. Nonetheless, her description was presented as evidence for an extraterrestrial origin of the debris.

My work on this comprehensive and uncritical look at UFOs, and my exposure to the many experts in the field, led me to the firm conviction that UFOs are not real.

Brad Goldberg
Studio City, Calif.

Enough of the Roswell foolishness! There has already been too much effort spent on the subject. Anyone who still believes that an alien spaceship crashed near Roswell will continue to believe so regardless of any lack of credible evidence. Any logical argument refuting the crash will always be brushed off as government coverup by the true believers. The people who have misinterpreted and misapplied the basic tenets of the founders of the world's great religions have done and continue to do more harm than believers in alien UFOs and the paranormal.

I have subscribed to SKEPTICAL INQUIRER for over ten years and am in full accord with the goals of CSICOP. I am not hopeful of success. However, not to make an all-out effort would guarantee failure.

Lynn A. Smitherman
Cottonwood, Ariz.

Heaven's Gate and Cults' Call

SKEPTICAL INQUIRER is one of the few periodicals I read from cover to cover, yet I read with special interest the recent reports on Heaven's Gate (July/August).

The mass suicide at Rancho Sante Fe was only the latest in a tragic string of famous disasters resulting from the discouragement and/or ridicule of critical thinking. Unfortunately, not all who abandon logic will keep their fantasies to themselves. I wish, for instance, that Timothy McVeigh had been in Heaven's Gate rather than at Oklahoma City.

For those of us who have been in cults, these events hold a particular significance. No matter their differing beliefs, all cults share with Heaven's Gate one important factor: a rabid contempt for skepticism. To doubt is to have weak faith. To question out loud is to admit defeat.

Even some supposedly "mainstream" religions have this in common. I want to chew bullets every time I hear a Christian

fundamentalist say that only faith in Jesus and study of the Bible can keep people from joining cults. Somehow the fact that Marshall Applewhite met both of these criteria eludes these zealots.

Cults will continue to be a problem until skepticism becomes a family value and critical thinking skills are treasured as much as a positive mental attitude.

I, therefore, salute CSICOP for leading by example.

Charles McAlpin
Calais, Maine

In "UFO Mythology: The Escape to Oblivion" (July/August), Paul Kurtz posited scientific illiteracy as the cause for the Heaven's Gate mass suicide, and, as a skeptic, found parallels between aspects of their message and "classical religions." Thomas R. Casten echoed these sentiments in "Can We Prevent Cult Deaths?" stating: "Our only protection against repeating the tragedy of Heaven's Gate is to learn and teach how science works."

Yet, ironically, it is the decline of traditional religions and the secularization of American culture that "opened the floodgates for a bizarre new Age of Superstition," as William Sims Bainbridge and Rodney Stark, two respected secular scholars, reported in this same publication almost two decades ago ("Superstitions: Old and New," *SI*, Summer 1980). They stated, "Persons with no religious affiliation are often the first to toy with novel or exotic supernatural notions and are not the secular rationalists we might want to think them."

Regarding the alleged parallels between Heaven's Gate and classical religions, Kurtz *painted with a brush that is far too wide.* The differences between this neo-Gnostic, pseudo-Christian sect and mainstream religions vastly outweigh any similarities. Unfortunately, SKEPTICAL INQUIRER's analysis of this complex and important social issue did not meet its own call for media responsibility.

John W. Morehead
Executive Vice President
TruthQuest Institute
Loomis, Calif.

In your special section on the Heaven's Gate tragedy, Thomas Casten asks, "Can we prevent cult deaths?" His answer is to encourage the general public to reject popular entertainment based on pseudoscience and embrace the scientific method. Other contributors to the section express similar thoughts.

I agree that too many people are too quick to believe the claims of pseudoscience and are, therefore, vulnerable to exploitation or the disordered thinking of a Marshall Applewhite. However, in looking at why this is true and what we can do about it, I feel that these articles and others in SKEPTICAL INQUIRER often fail to take into account an important fact about human nature.

All of us have an inborn need for something transcendent in our lives—something that seems bigger than ourselves, makes us experience wonder and passion, and gives meaning to our lives. Like the late Carl Sagan and many others, I find that there is enough wonder and mystery in the natural world to satisfy me.

But many people seem to crave more elaborate and concrete stories, such as those offered by Applewhite. They view the natural world as merely a background for these stories. Is this a product of the "stodgy and grumpy" way we teach science in our schools? Is a reliance on TV taking us away from the real world around us?

We not only need to do a better job of teaching the scientific method, we also need to make it attractive by associating it with our basic craving for wonder. The pursuit of knowledge about how the real world works can be more exciting than watching a silly TV story about an alien abduction. A reverence for the intrinsic mystery and drama of nature can give deeper meaning to our lives than the belief that some bearded old man put it all here for our pleasure.

Gretta Stone
Doylestown, Penn.

I think Paul Kurtz's feelings about religion got the better of him when he compared the Jewish Zealots at Masada to the Heaven's Gate followers ("UFO Mythology," July/August). The Zealots were religious—we may even call them religious fanatics—but they did not die "in quest of immortality," as Kurtz put it. They committed suicide because the other choice was to be literally enslaved by the Roman Empire.

If Kurtz can see no difference between the ramblings of Applewhite and the phrase "give me liberty or give me death," then he has grown too skeptical for me.

Robert Lopresti
Bellingham, Wash.

Paul Kurtz's referring to the mass suicide of the Masada Zealots in connection with the Heaven's Gate incident really merits some comment. . . .

I know of only two ancient authors who wrote about Masada, Flavius Josephus and Pliny the Elder, and it is from the former that we receive the detailed account of the suicide episode. According to that account, they chose death by their own hand over having their children sold into slavery, their wives first raped and then enslaved, and themselves most likely crucified like the hundreds of Judean insurrections who had take part in the failed uprising of 6 C.E. . . . Nothing in my reading of Josephus would lead me to ascribe their decision to kill themselves to escapism, unbridled unreason, chimerical notions, an excess of piety, or even cowardice. . . .

Ray Bono
Albany, N.Y.

Dennis Lee's Claims of Free Energy

Like Eric Krieg ("Examining the Amazing Free-Energy Claims of Dennis Lee," July/August), I also heard Dennis Lee talk of "free energy." Arthur Clarke had called from Sri Lanka about a demonstration in Washington, D.C., on March 5, 1996. I promised to go and report on what I saw and heard. Here is my reply to Arthur:

Dear Arthur,

I went along to the Union Railroad station yesterday for the Better World Technology demonstration. There is quite a bit to say, so let me tackle this in pieces. . . .

Dennis Lee, who did almost all the talking, is a tall, dark-haired American very experienced in presentation. He has a disarming manner and constantly refers to himself as more lucky than clever. In fact, because he disdains technical knowledge, it is hard to question him about technical matters.

He began by describing a heat pump that seemed to me to be quite conventional and comprehensible. The "low temperature phase change" technology is exactly that

employed in a refrigerator, with freon as the material that is cycled. Lee described his heat pump as better than anyone else's, and that may be true. It would require a good deal of study for me to prove otherwise, since this is not my field. Less plausible to me is the method by which the pump was designed. Lee says he came across it by accident, taking an evaporator, a compressor, and a condenser, of rather arbitrary sizes, dumping freon into them, and finding that the result performed better than anything else available by a factor of three. Because he says he is not technical, you can't get answers to some important questions, such as: Did he vary the parameters of his system? How does he know that his design is the best that there is (a claim that he makes)?

However, his heat pump claim is completely testable. If he had stopped there, I would have been favorably impressed.

I had more trouble with the next, nontechnical, statements he made. He asserted that he had built this device in the early 1980s and made $50 million in eighteen months. The electric companies then drove him out of business, made three attempts on his life, threatened his associates, and, in some way not altogether clear, arranged for him to serve two years in jail—time not wasted, he says, because he had seventeen new energy production ideas while locked up.

Ignoring all that, I was disturbed by three things in the next part of the presentation. First, there was a continuing confusion between energy storage and energy production. Second, Lee moved smoothly from the statement that he had a very efficient heat pump, which I can accept, to a statement that he had a pump that produced a net energy output—in other words, his efficiency was more than a hundred percent. Third, every conventional method of producing energy that I know of relies on the existence of a thermal gradient, usually in the form of a hot and a cold reservoir. These two seemed to be muddled in his discussion, with the heat flow going in the wrong direction. In other words, he took energy from his cold reservoir and put it into his hot reservoir. That's a neat trick.

Next he introduced a device he termed the "Fischer engine." This, as he describes it, is a steam (or, if you prefer, freon) engine that uses superheated water (or freon) under high pressure and requires no condenser. His explanation of how it works left me unsatisfied. . . .

After this, things became less comprehensible. Lee coupled his heat pump with the Fischer engine and asserted that the result would be more powerful than an internal combustion engine of the same size, would never need gasoline (or any other fuel), would not need any oil changes, and would run for 400,000 miles before it wore out.

If some of those statements seem remarkable, during the final hour several much more striking ones were provided. Lee declared that he knew five different ways to produce free electricity. He stated that he had seen a working antigravity machine. Finally, he again insisted that his desire to offer the world (or at least the United States) free, unlimited, pollution-less energy was being thwarted by the utility companies.

In summary, it was a fascinating evening that I think you would have enjoyed as much as I did. However, it seems a little premature to sell that Exxon or BP stock.

Regards, Charles

Charles Sheffield
Silver Spring, Md.

Chiropractic: Science and Pseudoscience

In a melange of criticism and praise, Joseph C. Keating's article on chiropractic ("Chiropractic: Science and Antiscience and Pseudoscience Side by Side," July/August) raises several issues requiring further consideration.

He quotes the endorsement of manipulative therapy for low-back pain by the Agency for Health Care Policy and Research. Most troublesome is the lumping of such complaints into a single category. Low-back pain is a symptom, not a diagnosis. It may arise from such diverse etiologies as muscle and ligament strain to the life-threatening problems of metastatic malignancy, aortic dissection, or posterior perforating peptic ulcer. What the patient with low-back pain needs is a specific diagnosis and appropriate therapy. To imply that patients with low-back pain, as a group, are to be treated with manipulation without such careful specific diagnosis is both misleading and potentially dangerous.

The author repeats the canard, often embraced by the alternativist, that "most medical procedures have not been experimentally validated." He provides no specifics and neglects the consideration that, for many recent decades, all new data is reported in peer-reviewed journals requiring careful fulfillment of appropriate protocols. Pointedly, even if one concedes this contention, does it imply acceptance without validation of other unproved practices, no matter how bizarre they may be?

Enthusiastically trumpeting the government agency's approval of manipulation for low-back pain, chiropractors continually entice patients into manipulative treatment for complaints often arising from organic disease. This alone justified the historic, unsuccessful attempt of the AMA to contain chiropractic. Keating lauds federally funded research grants to several chiropractic colleges. Granting of funds does not a priori predict a successful outcome of a research project. Federal funds have been dissipated in many unjustified areas. SKEPTICAL INQUIRER has often detailed the fantasies funded by legislators.

Are patients' lives and health to be uncritically exposed to the variety of practices chiropractic has espoused over the past hundred years? Legislators have demonstrated their inability to successfully address the problem of enthusiastic, convincing, and bogus claims. Who will?

Edward H. Davis, M.D.
Assoc. Clinical Professor Emeritus
State University of New York
College of Medicine at Brooklyn
Wellington, Fla.

I was somewhat appalled by the article by Joseph Keating Jr. about chiropractic. What bothered me was not so much Keating's defense of chiropractic—which is understandable, since he apparently derives his paycheck from a chiropractic institution—but what I interpreted as his willingness to gloss over the failure of chiropractic to test its own hypotheses and his use of arguments similar to what creationists use to disparage science. Specifically, I refer to the obfuscation he introduces by using the lay sense of the word *theories* instead of the scientific sense; the games he played with the word *epistemologies*; his arbitrary and strawman approach not only to the definition of the word *science* but also to his ridiculous ref-

erence to what he claims is Hollywood's vision of science—as if Hollywood is the standard by which science is measured; and his claim that "gobbledygook so often encountered among chiropractors has usually gone unchallenged within chiropractic institutions" because chiropractors have been "cut off from the wider health science community." . . .

Until such time that chiropractic has demonstrated that it has a sound scientific base and that the claims it makes are valid, chiropractors should not be permitted to inflict their specious ideas on unsuspecting patients. Therefore, chiropractic, with its untested ideas should not be reimbursed by third-party payers including Medicare/Medicaid. All reimbursement to chiropractors does is increase the costs of insurance for the rest of society.

Sheldon F. Gottlieb, Ph.D.
Dept. of Biological Sciences
University of South Alabama
Mobile, Ala.

I am amazed that you published an article by a chiropractor, one who actually wants to give this practice some credence. A number of years ago I was struck by a series of very severe headaches. A coworker suggested I try her chiropractor, saying that he had worked "miracles." I figured it couldn't really do any harm.

After a mediocre neck rub, which he called an adjustment, he gave me a bottle of "Chelated Bovine Adrenaline Extract," because, he said, my adrenaline was "obviously" too low. No X-rays, no "have you seen an M.D.?"

Skeptical, I tossed the pills in the wastebasket and made an appointment with an internist. After a series of tests, I was referred to a neurologist and a cardiologist. Not only was my production of adrenaline too *high*, but I also had a minor heart-valve problem and a nasty little aneurism in my brain, inoperable of course. If I had taken his junk, it could have been fatal. With proper medication, the pain has eased to a whisper.

Jeanne Weiske
Brooklyn Park, Minn.

For those of us who enjoy contradictions, Joseph Keating's pseudoscientific article on chiropractic was a delight. Much of Keating's article confines science to the scientific method, which he then fails to use to prove his point.

He admits that much of medicine has not been proven using the scientific method. It would seem that medicine is also comprised of science, pseudoscience, and antiscience. Is there really a scientific difference between medicine and chiropractic? Keating's evidence is primarily personal experience, which, according to his epistemological table, is "private empiricism" and is "antithetical to the wider scientific community."

The questions could be put to a test. A survey could be constructed that would determine the understanding of the scientific method and religious/philosophical tendencies. The survey could be given to large numbers of chiropractors and medical doctors, and the difference could be statistically derived.

Robert C. Affolten, D.C.
Bellingham, Wash.

Keating's article is a dangerous combination of pseudointellectual arrogance, "good old (medical) boy"-ism, and pseudoscientific cultism.

Yes, cultism. The cloak of an allegedly scientific "skeptical inquirer" cannot mask the moral depravity of a Benedict Arnold and a blatant wrongfulness equivalent to the Flat Earth Society. . . .

Keating's crumbs of praise to chiropractic in regards to positive findings of government studies on low-back pain are essentially meaningless. Chiropractic is not about back pain, but it includes that. Perception is not always reality. While the public may look to chiropractors for relief from neck and back pain, chiropractic patients, in the midst of their "pain-relief care," find improvements in conditions as diverse as asthma, menstrual problems, blood pressure abnormalities, ulcers, autoimmune diseases, chronic ear infections, etc. . . .

As SKEPTICAL INQUIRER is so interested in cults, perhaps we should consider Medicine as a cult.

Please terminate my subscription and forward my refund.

Donald E. Harte, D.C.
Kentfield, Calif.

In his article, Joseph Keating quotes Sid Williams of the International Chiropractors' Association as saying, "To hell with the scientists. They haven't proven a bumble bee can fly."

The bumble bee story seems to crop up fairly regularly and is always delivered in sneering tones by those with an antiscientific bent. So I was pleased to discover that John H. McMasters had delved into the origins of the story, as he describes in "The Flight of the Bumble Bee and Related Myths of Entomological Engineering" (*American Scientist* 77 [2]: 164–169). He traces the tale to a Swiss professor of aerodynamics during the 1930s who made some back-of-the-envelope calculations in response to a dinner-party question from a biologist. The simple assumption of laminar flow over flat, platelike wings proved less than air-worthy. So, like any sensible scientist, he went on to examine a real bee's wing under the microscope in an effort to find out why his calculations did not correspondence to reality.

It transpires, according to McMasters, that the veined structure of an insect wing forms a good imitation of an aerofoil—the bumble bee probably can fly after all!

Grant Hutchison
Dundee, Scotland
U.K.

A Rebuttal from Reisner

I would appreciate the opportunity to respond to the letters by Tyroler and Mak (July/August), which were highly critical of my article "Repressed Memories: True and False," and which also were critical of the editor of SKEPTICAL INQUIRER for including an abstract of this work in its Articles of Note section (March/April). The article in question was published in *The Psychological Record* (46: 563–579), which is a reputable and refereed scientific journal. Both critics strongly impune the objectivity of my article, using phrases such as "masquerading as," or "pretending to be" objective. Tyroler criticizes the editor for including ". . . a blatant piece of pseudoscience" in the Articles of Note section.

It is obvious that Tyroler and Mak strongly disagree with my conclusions, but they appear to substitute strong and pejorative language for a substantive critique. In my article, I acknowledged the existence of false memories (which can be very damaging when false accusations ensue) and made comparisons to other poten-

tially iatrogenic phenomena; but I also established evidence for the existence of some cases of true recovered repressed memory. Experimental evidence was cited in support of the concept of unconscious repressive defense mechanisms, and survey and case study data were cited in support of the existence of recovered repressed memories. Tyroler and Mak did not attempt to address any of the evidence that I cited. . . .

Substantive critique was not provided, but rather the critics simply asserted that the article lacked objectivity—an assertion based only upon their own authority and opinion. The one author used the ultimate invective, "pseudoscience," as if the use of a pejorative term can substitute for a convincing argument. Citing legitimate evidence in a peer-reviewed publication is not pseudoscience, even if the evidence supports a concept which is highly unpopular in some sectors of the behavioral-science community.

I believe the editor is to be commended for helping readers become aware of my article, despite its potential for controversy, because it is important for both sides of the recovered memory issue to be heard. Important existing evidence supporting the concept of repression is often absent in the writings of skeptics. The advancement of human knowledge requires that scholars and an educated public be exposed to a wide array of relevant evidence viewed from multiple perspectives.

Andrew D. Reisner, Psy.D.
Community Counseling Services
Galion, Ohio

Classroom 'Attitudes'

I am skeptical of wholesale allegations of student indifference to good education (Bauer, Book Review, July/August). As a research mathematician in academia, I have taught everything from remedial courses to graduate courses in two large state universities. Although I agree there are significant new problems such as grade inflation, I personally have not had Peter Sack's experience. I push my students quite hard. Most of them, including remedial students, rise to meet my high expectations *as long as* I put visible effort into teaching and communicate my passion for both mathematics and the teaching profession. In the classroom, the only thing more destructive than a student with an "attitude" is a teacher with an "attitude."

Shandelle Henson
Tucson, Ariz.

More Responses to Schick

Theodore Schick, in his response to letters (July/August), says "science isn't true because it works, it works because it is true." I believe it is meaningless to say that "science is true."

The core of science is a process, and you don't ask whether a process is "true," you ask whether it delivers the required results with acceptable operational behavior.

Richard Feynman summarized science as "guess then test." While oversimplified for most purposes, it is useful here (as long as we remember the vital feedback loop). Much of the current conflict occurs at the guess phase—if Friedrich Kekule can dream of a snake biting its tail, claim the structure of benzene, and get a Nobel prize, then what hope has science got to distinguish itself consistently at this phase? At an early stage, I don't believe you can categorize a theory as science, pseudoscience, or nonscience, and theories can move between these categories over their life cycle. What matters is what happens over that life cycle.

It is the test phase (plus feedback), summarized as "ongoing systematic skepticism" (a slogan for *SI*!), which adds value to science and provides its differentiator in the ideas marketplace. . . .

We should pay more attention to the test phase, because it is a major difference (perhaps *the* major difference) between science, pseudoscience, and nonscience, and because we ought to be able to quantify its benefits.

Schick is too dismissive of the pragmatic importance of whether something works and too casual about accepting that other systems "work."

Barry Pearson
Stockport, U.K.

The response to Schick's article, "The End of Science," which appeared in your March/April issue, taxed my tired brain. How could so many intelligent, educated critics completely disagree over what science is and what scientists do? Not one came directly to the heart of the matter, as did my late physics mentor, Dr. A. A. Knowlton, who said:

"When scientists reconcile their concepts with their percepts to the point of familiarity, they feel as if they discovered a fact. It has nothing to do with truth or with understanding."

To any student confessing an inability to understand electricity, he responded as follows with vocal emphasis:

"I don't understand it either! Electricity cannot be explained in terms of anything else. Get into the laboratory and learn from the equipment how voltage, current, and resistance vary with each other until you are thoroughly familiar with the subject. Your exam will be based on your familiarity with electricity, as required for its employment, not upon your understanding of it!"

Bernard Smith
Boca Raton, Fla.

Theodore Schick states, in his response to letters, that "Ptolemy's geocentric theory of the universe 'works' just as well as Copernicus's heliocentric theory in predicting the motion of the planets. But that doesn't mean that it is just as true. . . . Copernicus's theory provides a better explanation of planetary motion."

Actually, both Ptolemy's and Copernicus's theories were pretty poor; observational astronomers constantly had to "save the phenomena"—reconcile theoretical predictions with actual planetary positions—by piling up ever-increasing pyramids of orbits, cycles, and epicycles. The problem was not that Ptolemy had a geocentric and Copernicus a heliocentric system, but that both of them assumed that the planets moved in "perfect" circular orbits. The theory that finally won the day was Kepler's, which set the planets in elliptical orbits—philosophically outrageous, but pragmatically true, like many other scientific breakthroughs.

Dick Eney
Bladensburg, Md.

The letters coloumn is a forum for views on the matters raised in previous issues. Letters should be no more than 225 words. Due to the volume of letters, not all can be published. They should be typed double-spaced. Address: Letters to the Editor, SKEPTICAL INQUIRER, 944 Deer Dr. NE, Albuquerque, NM 87122.

THE COMMITTEE FOR THE SCIENTIFIC INVESTIGATION OF CLAIMS OF THE PARANORMAL

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- Prepares bibliographies of published materials that carefully examine such claims
- Encourages research by objective and impartial inquiry in areas where it is needed
- Convenes conferences and meetings
- Publishes articles that examine claims of the paranormal
- Does not reject claims on a priori grounds, antecedent to inquiry, but examines them objectively and carefully

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